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# FAA Aviation News

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**Back Cover:** *What do the letters in the surface weather observations really mean? See page 16. Photo by G. S. Livack*

# Looking Back

by Glenn Showalter

*In our editorial series you have heard mostly FAA's opinions about things. Time for a break, don't you think? What follows are the musings of someone who loves airplanes and flying. Yet, in his reminiscences, there are a few good lessons.* ***—Editor***

Late last year, the McNeil-Lehrer Report had an exciting segment. An older gentleman (over 70) was flying his Piper *Comanche* to see a friend in Kansas. He was still a good pilot and still excited about flying. Seeing that airplane brought back some memories, one being the time I first checked out in this high performance, single engine bird at Billings, MT Airport in 1974. The check pilot required only one landing, since I was plenty current in this type of airplane, and my takeoff, traffic pattern, and landing was something just slightly short of perfection. Actually, I surprised myself because I had never flown this particular model before, and it had a reputation of being a "hot" airplane. The landing was one of those where you really don't know the wheels have touched down until you use the brakes.

Every pilot has those flights once in a while, but it takes a lot of practice and experience to be consistent. I was a commercial pilot fully rated at the time, and even though this was the first time I had flown a *Comanche*, I flew it as though she was a personal aircraft. My sights long set on an airline career received an ego boost that day, for it was one of those career happenings that says you are good, very good. This is necessary if a person is going to sacrifice so much for a goal. Self-confidence is important when flying an airplane. Basic skills are important as well, but I felt that day that if I could understand and handle an airplane that well, that fast, I could do anything.

*Glenn Showalter*

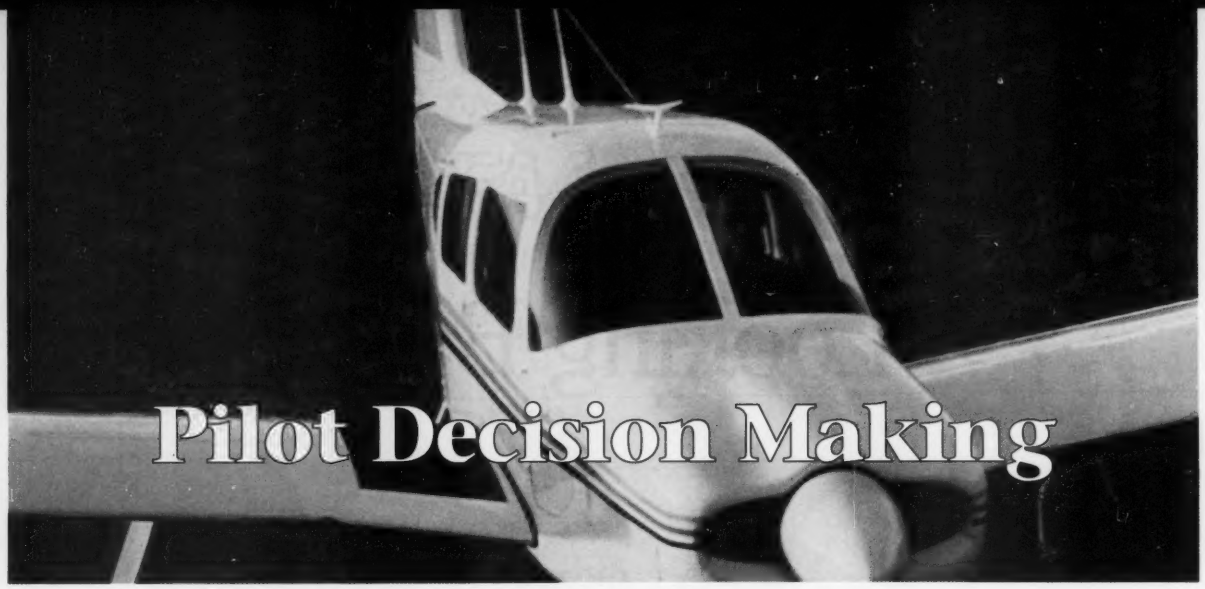
Fortunately for my career, such success was not short lived. Later that winter, I served as a charter pilot for a Glasgow, MT family, flying them through the Rocky Mountains to Durango, CO and return. It was a very enjoyable trip and my first in that part of the country. While I had plenty of cross-country experience, this was a challenging trip especially when it came to trying to receive some navigational stations at the "lower" altitudes (12,500' MSL) necessary for non-pressurized airplanes. But the weather was good, the Cessna Turbo 206 performed well, and we all had a great time.

The following spring brought my first flight to the Pacific Coast. The delight of seeing the Pacific Ocean for the first time at about 1,000 feet above the beach was unforgettable. The years of flight training and study had paid off.

Flying does more than get you from one place to another. Both art and science, flight develops in a person the ability to get the big picture, to pay attention to all those flight techniques, principles of science, other aircraft, gauges, possible obstructions, weather, regulations, etc. Dwelling on any one of those aspects to the neglect of the others can cause you problems because the airplane is unforgiving.

The aviation industry is both valuable and noble, doing more for humankind than the Wright Brothers ever dreamed of and certainly more than some of the "junk" industries we have today. A lot of people have served the aviation industry well, but one tends to reflect from time to time on his (or her) own personal efforts and the things he wishes he could have done if only

*Continued on page 4*



# Pilot Decision Making

by Tom Hamilton

## Stress

Decision Making

*This is Part Three of a seven-part series that first appeared in* Balloon Life *magazine and was originally written for balloon pilots. For the most part, we have left the lighter-than-air examples in because the overlying issue of pilot decision making affects all pilots, and the excellent information in these articles can be extrapolated to aviation activities other than ballooning.* ***—Editor***

What is stress? The dictionary defines it as, "pressure, strain, esp., a force that tends to distort a body." In this article we will look at types of stress that affect our ability as pilots; stress and pilot performance; how to identify stress; and how to cope with stress.

In our earlier discussions on **Pilot Decision Making** (May/June and July/August issues of *FAA Aviation News*), we defined headwork as the intellectual process used to formulate decision making strategies. Stress interferes with headwork.

The FAA defines stress as the body's response to any demand made upon it by physical, physiological, or psychological factors known as stressors. We'll look at each of these areas.

**Physical stressors** include conditions associated with the environment. Temperature and humidity extremes, noise, vibration, and lack of oxygen are examples. Think back to when you might have experienced some of these situations: a hot, humid afternoon flight, passengers talking, engine doesn't sound right, static on the radio, etc. Even the physical work of loading/unloading the aircraft can make a pilot pretty edgy.

**Physiological stressors** include conditions associated with the body, such as fatigue, lack of physical fitness, sleep loss, missed meals (low blood sugar levels), and illness. How late were you up last night? Did you have breakfast before the flight? Do you have a cold or other ailment that might affect your performance?

**Psychological stressors** are related to social or emotional factors; e.g., death in the family, marriage, divorce, sickness in the family, work-related problems, domestic fights, etc. Or they may be related to mental workload such as analyzing a problem, navigating the aircraft, or making decisions.

One or more of these elements can enter into play and affect your performance. For a balloon pilot for instance: You were up late last night at the welcoming reception at a balloon rally, and this after a long drive. You arrived at the launch field about half-way through the flight briefing because it was so hard to get out of bed, let alone make time for coffee. Now you are two hours into the flight, having miserably missed the target. You are over a heavily wooded area leading to a wide river. The crew will have to drive at least an hour to reach the other side. What if you don't make it across? Can your passengers swim? Will your insurance cover the loss? The burner is beginning to sound funny, your palms are sweating, your mouth is dry, and your heart is pounding!

Now what? You feel a growing sense of urgency and tension. Stress takes control of your normal thought process. You become confused and unfocused on the problems at hand. You begin to give too much attention to "what if" questions which you should be ignoring. You are reaching (or have reached) a state of stress overload. You begin to use poor judgement that can result in a series of bad decisions.

This may be an over dramatization, but stress is a part of our everyday life and can be broken into two components—*static* and *dynamic* stress.

***Static stress*** is what we might call constant, everyday stressors such as financial problems, job pressures, rush hour traffic, "having" to fly, or just flying! Yes, even those things in life that you find enjoyable can be stressors since they represent a change in your environment that must be dealt with.

***Dynamic stress*** involves those stressors that develop as the situation evolves: the engine sounds "off," a passenger is asking too many questions, you're over the water and fuel is

getting low, and so on. The effects of these stressors are cumulative. Eventually, they can add up to a level that makes it difficult to deal with the situation at hand.

### Stress and Performance

Stress, at least to some degree, is with us at all times. In fact, some people seek stress to make life more interesting. As you can see in the diagram in Figure 1, some stress is good for you. It keeps you on your toes and prevents complacency from setting in. Some stress helps prevent accidents.

Stress helps? We just mentioned that stress, or the effects of stressors, are cumulative. Looking at Figure 1, we see that the relationship between stress and performance has a positive effect up to a point. Performance, then, will generally increase with the onset of stress but only to a point. Beyond a certain level, performance begins to fall off rapidly as stress levels exceed your ability to cope.

At low levels of stress, the pilot experiences boredom and is not taking into consideration all the elements that are necessary to fly the aircraft and make good pilot decisions. At the other end of the spectrum, panic takes control and the pilot's ability to think clearly or think at all is severely impaired.

### Task Requirements and Pilot Capabilities

Accidents or mishaps often occur when flying task requirements exceed pilot capabilities. Stress plays an important role by adversely affecting the pilot's capabilities. Figure 2 is an idealized chart developed by the AOPA Air Safety Foundation for the FAA. This chart was adapted to balloon operations.

The top line shows pilot capabilities over the period of the flight. The bottom line indicates the task requirements or degrees of ability needed. The shaded area between the two lines represents what is known as the margin of safety, the difference between our ability and that required by the task.

Over time the pilot's capabilities slowly deteriorate. This deterioration

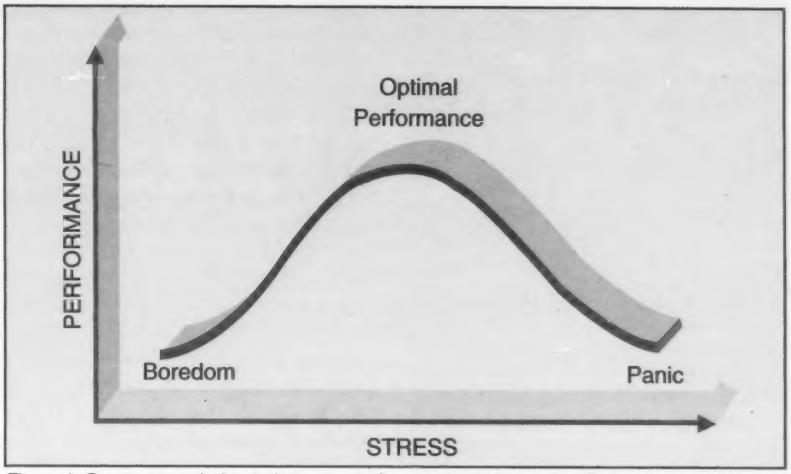



*Figure 1. Some stress helps to improve performance up to a point. Beyond a certain level performance begins to fall off rapidly as stress levels exceed your ability to cope.*

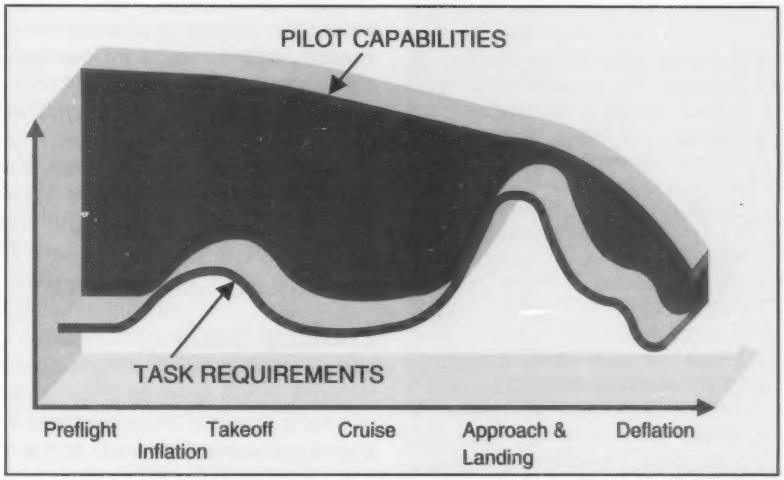



*Figure 2. The blue shaded area shows the difference between our ability and that required by the task—the margin of safety.*

can come from a variety of sources: the cumulative effects of staying up late, fatigue (physical and mental), low blood sugar, illness, alcohol, etc.

Figure 3 shows the balloon accident statistic chart for each phase of flight from NTSB reports. Notice that 69% of the accidents happen during approach to landing and landing phase of operation—a critical time in terms of ability needed and stress buildup.

We talked about the pilot's capabilities deteriorating over the time line of a flight. What about, for example, over the length of a balloon rally? [Fixed-

*Figure 3. Balloon Accidents Chart*

***Are You Fit to Fly?***

**"I'M SAFE" CHECKLIST**

**I**llness?
**M**edication?
**S**tress?
**A**lcohol?
**F**atigue?
**E**ating?

**Don't forget to preflight yourself!**

When you are carrying passengers, make sure they are calm, informed, and prepared. Avoid situations that distract you from flying the aircraft. If you feel tension mounting, you might take a deep breath and try stretching; be calm, think for a moment, weigh the alternatives, then act. Fear and panic are your greatest enemies.

Your best tool for combating fear and panic is to familiarize yourself thoroughly with your aircraft, its systems, and the emergency procedures, along with the terrain and communications requirements. It is important to remain proficient in the aircraft you are flying. When was the last time you had another pilot fly with you and evaluate your performance besides your flight review? The Pilot Proficiency Awards Program ("Wings") is another avenue for getting some needed dual instruction.

When you're on the ground is a good time to think through "what if" situations that might occur in the air. Always have an alternate plan, and leave yourself some leeway, a way out.

One last thought. Don't let little mistakes bother you. If you make a little mistake, forget it right away and return your entire attention to flying. Don't keep thinking, "Why did I do that? How could I be so stupid? Where did I go wrong?" If you do this, your mental energies and attention will be distracted from the job of flying.

Flying is enjoyable and fun. Don't let static and dynamic stress build up to a point that the task requirements at hand exceed your ability as a pilot.

*Figure 4*

wing pilots who have flown short-hop charters or multiple legs for a commuter can relate to this example.] First, you may have had to drive several hundred miles to attend. There are parties, one or two flights a day, pressure of competition, and so on. Here again, the cumulative effects of stress are building up. Pilots who attend the nine day Albuquerque International Balloon Fiesta often hope for rain or bad weather by mid-week to get a day's rest. Many will take a day or two off to go sight-seeing, and some have more than one pilot registered to fly the balloon so that they can trade off and lessen the stress on each.

### Stress Management in the Cockpit

Before beginning any flight you want to make sure that you have planned thoroughly. Receiving and evaluating weather information, flight planning, passenger and crew briefing (if applicable), and preflighting the aircraft are all part of it.

Don't forget to preflight yourself. The "I'M SAFE" checklist in Figure 4 is a valuable tool to use in preflighting yourself. ■

## Looking Back

*Continued from page 1*

given the chance. There are times in any person's career when you wonder if you should have chosen something else or would have been better off taking over Dad's business. Looking back on my aviation career, I realize it was the right choice

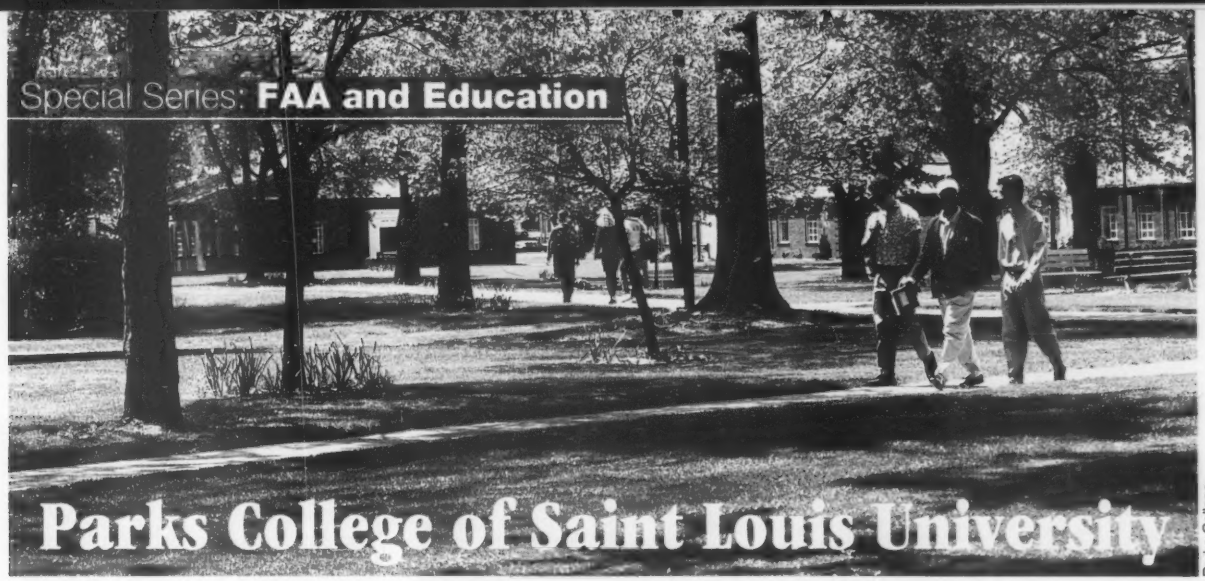
Looking back again on the Piper *Comanche* flight that fall day, I also remembered my first "grease job" landing made while working on my private pilot's license. In 1967 Dulles Airport in Virginia was new, and even on busy days, traffic was light. For general aviation, Dulles was a pilot's dream: Big airport practice and facilities with very little big jet traffic. I occasionally stopped at Dulles for breakfast. The price was reasonable and the food quite good. In those days a general aviation pilot could just taxi up near the tower and zip in for scrambled eggs, hot cakes, Virginia ham, toast, and OJ.

I visited Dulles not too long ago but this time as an airline passenger. Aside from the thrill of flying there was something special in the air, the feeling of meeting an old friend again. It just seemed that in spite of the problems the airline industry was going through, people realized you were someone who tried to make a contribution. As the engines came up to takeoff thrust, the same warm, overwhelming feeling came over me.

Seattle was my home for many years. I first moved there on a tip for a flying job and stayed. I was flying some people from the mountain region of Montana to Seattle, and an early winter storm had brought rare, light snow to the Puget Sound area. En route, we had enjoyed a beautiful sunset on top of the overcast. The night approach and landing at Seattle Boeing Field gave my copilot/friend his first experience at seeing an instrument landing. The winds were seven knots out of the north so approach control was going to bring us in from the south for the backcourse localizer to 31. I noted to air traffic control that weather was below backcourse minimums and I would accept the ILS 13 with tailwind. The runway was snow covered, and my planned firm touchdown turned out to be a smooth roll on. Such smooth landings tend to be impressive to passengers, but for the sake of the student working on his private pilot's license, I pointed out that while the landing was safe, a firm touchdown allows the tires to make solid contact with the runway surface, important for braking while on wet or snow-covered runways and for reducing the aerodynamic effects of the wings as soon as possible.

As we taxied to the ramp, an MU–2 prop jet landed, nearly spinning out of control. The potentially hazardous situation might have been prevented had the pilots made a firmer touchdown. So, when your airline captain plants those tires on the runway with a "bounce-thud" technique, cut him or her some slack and realize the "old man" up front knows you'd be more impressed with a smooth roll-on. ■

Special Series: **FAA and Education**



# Parks College of Saint Louis University

Parks College

by Phyllis Anne Duncan, *Editor*

How many institutions of higher learning do you know that were founded because of a succession of rough landings and a profound religious experience?

Only one comes to mind, and that's Parks College of Saint Louis University in Cahokia, IL.

At its inception, the name was simply, "Parks Air College," and it was started by an Illinois automobile salesman who had the flying bug and who became dissatisfied with the short amount of instruction he received when learning to fly. Nearly 70 years later Parks College boasts airline and military pilots, engineers, NASA technicians, teachers, and FAA employees among its graduates.

Oliver Lafayette Parks was born in Minonk, IL and has been described by his biographers as a workaholic and a visionary. Certainly there were others who may have called him a fool until they experienced his success. More than a salesman, he was a promoter who used techniques commonplace now but unheard of in the 1920's. Yet, he was also a man of conviction. After winning a top automobile salesman award and not receiving the promised dealership, he told the company off and left to learn how to fly.

A Marine in World War I, Lafe (he abhorred Oliver or Ollie) had probably seen the aircraft of the day, and perhaps they inspired him in his future endeavors. Most write of him, however, as a man who saw no limits, who overreached himself financially on many occasions, but who succeeded often enough to leave a legacy behind.

In 1925 Parks went to Lambert Field in St. Louis, MO and learned how to fly at Robertson Aircraft Corporation. In the days before federal regulation, pilots could earn certification in a day for about $100. After receiving his license in this manner, Parks began taking people for St. Louis sightseeing flights in a Standard J–1.

Whether the unreliability of the Standard's engine or Parks' fledgling pilot skills, many of these flights ended in forced landings off airport. The one that got his attention was his loss of control of the Standard while making a simple turn around the flagpole of Sportsman's Field, home of Ty Cobb and the St. Louis Cardinals. He recovered before having to crash land, but he realized that the shortness of his pilot training was to blame.

Someone else may have given up flying at this revelation, but Parks the businessman saw it as an opportunity. Parks the pilot wanted to improve his and other pilots' skills.

So, on August 1, 1927 he opened Parks Air College at Lambert Field. The faculty of one (himself) used the Standard and a Laird *Swallow* for instruction. Using his salesman's promotional skills, he soon had several students signed up for the course of training. However, his own skills may still have been somewhat suspect.

In 1927 while taking a young woman for a thrill ride at the request of her boyfriend, Parks deliberately put the *Swallow* in a spin from which he could not recover. He crashed on the grounds of the St. Stanislaus Jesuit Seminary northwest of the airport. Seminarians rushing to the scene found Parks unconscious, severe injuries to his back and legs, his left eye gone, and his teeth knocked out. (The fate of his passenger was unreported.) In the face of such injuries, the Father Rector blessed Parks and baptized him on the spot. Parks later attributed his recovery to this natural reaction of a Catholic priest, and the incident was to have future importance for Parks Air College.

For the present, its Director and only instructor was in the hospital, and the six students who had given him their money were justly concerned about their and the school's future. When confronted by their spokesman, Parks again used his promotional ability, detailing his plans to move the school to its own 113-acre campus and to increase the number of training hours to 50. Parks was able to sell them on his dream, and many of those early students went on to become faculty and stay with Parks until the end of his life.

Because Parks was a "solid businessman" in the area, he was able to

Parks College

*Charles "Slim" Lindbergh, Oliver L. Parks and Boots Dempsey on the Parks College campus, October 1929*

make a better impression on prospective investors than the "here today, gone tomorrow" barnstorming pilots who usually came through the St. Louis area. He was able to convince the owner of a field in Cahokia, IL to give him land for his college campus. Initially, the landowner may have felt he had put something over on Parks. The site was described universally as a "mud hole," politely as a swamp. It was bottom land, just a mile from the Mississippi that had not yet been controlled by levees.

Impressed by a nationwide blitz of advertising for an "air college," the students came in droves.

More students meant more flight hours on the training planes, which were now *Travelaires*. (Parks also sold *Travelaires* from the new Parks Airfield.) The college began getting behind in its maintenance and so Parks founded the Mechanics School of Parks Air College. This was immediately promoted as "Learn to fly them and fix them!"

Enrollment increased to the point where a dormitory had to be built. Students had a well-rounded air education, but they were also expected to work. Parks told them this up front, and the students expected to wash and fuel airplanes—which they did. But they also cleared land, built hangars, cleaned the grounds, and put out the boundary light smudge pots at night—all for a 50¢ per hour credit against their lessons. They did it happily.

In addition to the basic pilot and mechanic training, Parks added instrument and night flight training. Parks Airfield became the first in the St. Louis area to be fully illuminated and used for night flights. In the 1920's and 1930's aviation's famous came to Parks Air College to visit or to brush up on their skills—Lindbergh, Earhart, and stunt pilot Frank Hawks.

Parks also caught the airplane building bug, perhaps a businessman's natural response to two other airplane manufacturers beginning operations in St. Louis. He formed Parks Aircraft Manufacturing Company on the field, and the students learned design and manufacturing by modifying an open cockpit biplane. They named it the Parks P–1. The P–2 followed shortly after and was used for night training. A third model, called the *Sunbeam,* was short-lived. In fact, the aircraft building venture itself was equally short-lived. The manufacturing company turned out 84 airplanes but managed to lose a quarter of a million dollars.

Parks was forced to sell out most of the College's stock but chafed under the new management. He mortgaged his house, sold his cars, brought his employees in as stockholders, and borrowed money from his friends and more from his existing creditors and bought the company back. This was a gesture to regain control of his school; the company never built another aircraft.

Parks College's association with aviation education is nearly 70 years old. Its association with the FAA and aviation safety is almost as old. In 1929 the Air College received the first Department of Commerce (an FAA precursor) certificate for a Transport and Limited Commercial Ground and Flying School. This prompted Parks to build a three-story, brick dormitory for the increasing numbers of students and to modernize the Mechanic School's equipment. In 1930 the College received its 14th certificate from the Department of Commerce, this for a Repair Station, and soon planes from all over the country were arriving for overhauls and rebuilding. The school became a refueling stop for the Bendix

Air Race in 1929, and the first racer to land there was Roscoe Turner. It was also a landing spot for the first all women's transcontinental air race (1929). All this success occurred at the onset of the country's Great Depression.

This is not to say that the school was not affected by the Depression. Its enrollment plummeted from 400 to 33 over a three-year period. Despite the loss of students, Parks fired none of the faculty; indeed, they outnumbered the student body at one point. Occasionally, he skipped paydays, but no one seemed to care as long as they had a job. Parks never skipped out on his debts though. He wrote explanatory letters, made apologetic phone calls, and borrowed from friends to pay the bills. Everybody was eventually reimbursed when Parks College was one of the few aviation schools that survived the depression.

This success, ironically enough, is attributed to Parks' approach to aviation education. Most aviation schools of the 1920's and 1930's emphasized their few entrance requirements, simple enrollment process, low cost, and quick graduation. They failed, and Parks College with its requirements of a high school diploma, lengthy course of study, and well-rounded curricula that took time to master succeeded. Its pilots and mechanics were better prepared at all aspects of aviation when they graduated. Parks also kept in touch with the growing aviation industry and was able to adjust programs at the school to keep up. Eventually, the school offered four two-year courses all of which led to a Bachelor of Science Degree: Professional Flight and Executive Training, Aviation Operations and Executive Training, Maintenance Engineering, and Aeronautical Engineering. Even if a student selected one as a major, he (and in those days it was all "he's") still had to cross-train somewhat in the other three.

As Parks College graduates went out into the aviation business world, the success of Parks' approach was evident. Enrollment continued to increase, and the school continued to grow. To teach students how to man-

## *Women in Aviation Conference*

by Dr. Peggy Baty, *Parks College*

Women in aviation today are still a rare commodity. Although their numbers have improved dramatically during the past decade, the percentage remains small. Often women in aviation feel isolated; i.e., they may be one of a few, if not the only, professional women in aviation in their group or organization.

One of the tasks facing the aviation industry today is the need to encourage young people to consider aviation as a career option to meet the human resource needs of tomorrow. Too many times only males receive this kind of counseling because often their teachers and guidance counselors still believe in the stereotype of aviation being only for men.

In response to these two issues, Parks College of Saint Louis University has hosted the second through the fourth National Women in Aviation Conferences when Dr. Baty came to Parks. The first was held in 1990 in Arizona and was a success with its 150 participants, primarily women, from 17 states. The response to the conference was so enthusiastic that 98% of those attending asked that it be made an annual affair. Parks College stepped in as sponsor to assure that.

The second conference held in 1991 in St. Louis, MO boasted approximately 300 attendees from 22 states and a few participants from Canada. In 1992 the conference moved to Las Vegas, NV where nearly 500 men and women from all parts of the aviation industry attended. Thirty-five states were represented. This year's conference, back in St. Louis, had 535 participants, representing 40 states and three foreign countries. The name has now officially changed to the International Women in Aviation Conference.

The annual conference served the following three objectives:

1. Educates the general public regarding women's contributions to aviation, past and present.
2. Allows women in various aviation occupations (pilots, controllers, mechanics, engineers, etc.) to network.
3. Provides role models and information to young women of high school and college age about aviation careers.

The conference continues to be timely because of the concerns for the under-representation of women in traditionally male-dominated careers and the upcoming human resource needs of the aviation industry. From what began as an idea for a one-time, single-state meeting, the conference has grown beyond anyone's dreams. It has evidently filled a need in the aviation community—the reason for its success.

Next year's (1994) conference will be held March 10–12 at the Walt Disney World Contemporary Hotel in Orlando, FL. The conference's emphasis will be on networking and other career development skills. For more information, contact Dr. Peggy Baty or Hilda Ramage at (618) 337–7500, extension 203.

Parks College

Parks College

age an airline, he started one, Parks Air College Airline. The school was one of the first to qualify for the Civilian Pilot Training Program and the newly established CAA subsidized 30 students from the Works Progress Administration. Eventually, Parks Air College would train 15% of the World War II aviation cadets.

Parks himself, and perhaps incongruously, was an intensely spiritual man. The near fatal accident that led him to start an air college also led him to convert to Catholicism, and he maintained a close spiritual and personal relationship with the Jesuits—a relationship with led him to "give" Parks Air College to the Jesuits' Saint Louis University in 1946. He would remain as Dean of the school at a salary of $1 a year. Theology and ethics taught by Jesuits joined courses on flying and maintenance, and the G.I. Bill brought scores and scores of new students to the campus.

Although Parks' direct involvement was not as evident as in early years, by the college's 25th anniversary in 1952, its functional Dean, Niels Beck, was showing himself as visionary as Parks had been two and a half decades before. Beck was looking forward to the space age. In 1954, Beck invited Werner von Braun, father of America's space program, to speak at Parks College about a possible flight to the moon. von Braun also donated a rocket engine to the school. Willi Ley, another of the German rocket scientists the U.S. had employed after World War II, also visited the college, and its students and faculty quickly began considering how the college could contribute to this new frontier. New departments were instituted—General Sciences, Basic Engineering, and, from the Jesuit influence, Humanities and Social Sciences. Many Parks College graduates held significant positions in NASA, planning and designing the Apollo program and providing operational management for the Space Shuttle project.

Financial setbacks in the 1960's and 1970's caused the Jesuits to consider closing Parks College. Amid the rumors and confusion over the school's fate, enrollment dropped, and a woman director of public relations, Marjorie Rose Beintker, designed a recruitment campaign that rivaled the big sports schools of today. Another area she reached out to were women, long a shortage on the campus. As a result, the college met its goal of "710 in 1971," and now includes women airline pilots among its alumni. The number of women attending the school has steadily increased in the past two decades. Parks College at Saint Louis University for the past three years has sponsored a unique convention, the Women in Aviation Conference (WIAC). Conceived by Dr. Peggy Baty, Academic Dean at Parks and an avid pilot and instructor, WIAC has become a mainstay in the international aviation convention scene. The 1993 conference, held across the river from the college in St. Louis, featured practical, operational workshops on thorough preflighting, panel discussions on the role of women military aviators in combat, and seminars on job opportunities with airlines, the military, and the FAA. (*See the sidebar on p. 7 for more on the WIAC.—Editor*)

Parks College is now thriving. Its flight school has 28 aircraft: One of the surviving P–1's, a 1961 DeHavilland *Beaver,* a Cessna 310, four Mooney 201's, 14 Cessna 152's, and 7

*Continued on page 11*

# The First Non-stop Transcontinental Flight in the U.S.

Macready Foundation/Sally M. Wallace

by Sally Macready Wallace

## Part 1

In the years following World War I, the fledgling U.S. Army Air Service was fighting for its very existence. The Government was looking for ways to cut spending, and the public saw aviation as an unnecessary frill and a luxury. Air Service pilots knew that the public needed some tangible evidence of the commercial value of aviation and proposed an ambitious plan: to fly across the U.S. *non-stop*, thereby demonstrating, irrefutably, the feasibility of commercial flying as a means of transportation.

The idea for a non-stop flight evolved from the strategic goals of reducing the time needed to deploy military airplanes crosscountry and proving that it could be done within a 24 hour period. Eventually, a few pilots such as the air mail pilots and Jimmy Doolittle would succeed in a transcontinental flight, but they had made at least one stop along the way. It was late 1921 when rumors of a proposed non-stop transcontinental flight spread among the Air Service pilots at McCook Field, OH. Many considered the idea impractical, since they believed neither man nor airplane was equipped for such a trip.

To overcome the first obstacle of an appropriately equipped airplane, First Lieutenants Oakley G. Kelly and Muir S. Fairchild researched the cruising speed, load-carrying capacity, fuel consumption, reliability, and other characteristics

*John A. Macready*

of several aircraft. They finally decided on the Fokker IV, a Dutch passenger plane which the Army then designated as the Fokker T–2 for the transcontinental flight. Originally, the monoplane accommodated eight passengers plus crew and carried 130 gallons of fuel. When the Army finished its modifications the aircraft had more oil and water capacity, an auxiliary radiator, an oil radiator, larger and stronger wheels, a door between the cockpit and cabin (we'll see why later), a set of controls in the cabin, and a fuel capacity of 737 gallons (increased by adding tanks in the wings and cabin). These modifications made maneuvering rather difficult inside the cabin, to say the least. Fully loaded, the airplane grossed at 10,580 lbs. According to engineering calculations, 11,000 lbs. was the maximum gross takeoff weight.

The cast of characters changed in 1922 when First Lieutenant John A. Macready replaced Fairchild, who had been injured in an airplane crash. The two pilots (Kelly and Macready) expected to fly out to San Diego, CA about 10 days before the full moon to bask in the sun at Coronado Island and take a few swims in the Pacific—a little R and R before the trip. The actuality was a bit different. In Dayton they had the entire Engineering Department behind them. In San Diego they and two mechanics had to do all the preparation themselves, which included installing a new engine and preparing the plane in general for the long trip. The biggest job was clearing a two-mile runway across North Island so they could take off. Their airport of choice, Rockwell Field, had been inactive for several years and was covered with clumps of brush, bunch grass, and small hummocks of sandy soil.

Although Macready and Kelly received splendid cooperation from the U.S. Weather Bureau, traditional weather forecasting in the 1920's was still aimed at farmers and was not what was needed for transcontinental, non-stop flights. At first there was some confusion as to their needs, i.e., storm fronts or winds aloft? The plan was to fly from San Diego to New York City, since the prevailing winds would favor a flight from west to east. The flip side of

Macready Foundation/Sally M. Wallace

*Fokker T–2 plane in flight*

that was that they would have to climb over the Sierra Nevada mountains while the plane was at gross weight, which could prove a problem.

The weather report on Wednesday, October 4, at 8:30 p.m. was favorable for an early start the next morning. The two pilots were out at the field before dawn. There were high clouds overhead. Blocks were removed from the wheels of the plane, throttle applied. The big plane hesitated, then slowly moved forward. After a run of about a mile, it slowly lifted off the ground, and Kelly and Macready were airborne. So heavily loaded was the big monoplane, they made two complete circles of the island before they reach 200 feet.

The T–2 had climbed to 1,700 feet by the time they reached the Temecula Pass, about 50 miles from San Diego. Then, they flew straight into a cloud bank. "We dived blindly into the white mass and came through the cloud and pass with a short stretch of lower, open rolling country ahead," said Macready. Their route was northeast of San Jacinto, then over a narrow stretch of mountains and foothills to Banning at an elevation of 2,700 feet. At San Jacinto they ran into more thick fog and low clouds. After dodging foothills for one hour hoping the fog would dissipate or break, they decided any attempt to fly through those winding mountain passes in a heavily loaded plane with visibility no more than 50 feet ahead was not a viable plan. After a quick consultation, they decided to return to Rockwell Field to try for an endurance record. Macready said later, "The primary reason for staying in the air for two long days and a night on an endurance flight was because we did not have the nerve to return to San Diego at once after being hand-shaked, slapped on the back. . . and started for New York with all proper ceremony and eclat!"

The pilots took turns of six hours each, flying the plane from the open cockpit out front just eight inches from the engine. When it was shift change time, the front pilot wiggled the stick and the pilot in back flew until the front pilot crawled back through the narrow tunnel to the rear, taking the controls while the relief pilot crawled forward. There was no sleep for either flyer during the entire 35-hour endurance record flight. They broke the world record by over eight hours and gained invaluable data on fuel, water, and oil consumption for future transcontinental tries.

Although disappointed at the failure of their original plan, Macready and Kelly were ready for another transcontinental attempt shortly after landing, and again were watching the weather closely for another takeoff. On November 5, armed with a more favorable weather report, they arrived at Rockwell Field in the 5:00 a.m. darkness. As they had to arrange for their own food and beverage for the trip, they came complete with tins of chicken sandwiches, soup, and hot coffee for the long flight. The weather was clear, and this time they cleared Temecula and Banning passes without effort.

Their route took them to Tucson, AZ but, as they approached the area, it became a continuous struggle with the plane to cross over the high passes, mountains, and elevations. The air was very rough and bumpy; numerous air currents lifted the airplane 100 feet, then plunged it down sharply. For long periods the T–2 was flown within 40 to 50 feet of the ground, unable to gain altitude. To make matters worse, a terrific wind came up from the south, making flying the heavily loaded plane difficult and fatiguing. It finally became obvious if they continued their route they would fly right into the ground, so they turned south over New Mexico's salt marshes and ancient volcanic lava beds, a very picturesque portion of the flight, according to Macready. Almost certainly, no planes had ever flown over this area.

As they approached the Colorado Divide, climbing over the mountains looked doubtful. However, with each gallon of fuel burned, the plane rose a few more feet and finally they reached an altitude of 150 feet above the terrain. Then, just as they reached the divide, a sudden downdraft hit them, and the T–2 went diving toward the ground at terrific speed, missing the cactus and

Macready Foundation/Sally M. Wallace

*Fokker T–2 plane, pilots Kelly and Macready, and gasoline drums used on flight.*

shrubbery by inches. The plane flew for miles not more than 20 feet above the ground, both pilots expecting to crash at any moment. But once again, as the aircraft burned fuel, they were able to gain altitude, and the flight continued.

Clouds began to form, and darkness came on, and the pilot flying at this point (Macready) needed a known point of reference to start the night portion of the flight. Weather conditions continued to deteriorate, and the clouds were so low Macready had to either fly through them or fly dangerously close to the ground. Consequently, he displayed great flying skill in avoiding the farmhouses, trees, and buildings in the inky, black night.

That first night they followed train tracks when they could see them, and occasionally the strong headlights of a train would appear to guide them. Thunderstorms and lightning were in all quadrants; rain clouded up the pilot's goggles, impairing vision. Their morale was very low at this point, but they pressed on even though their navigation reliance was entirely upon the magnetic compass. "The people of Kansas and Oklahoma apparently retire early," Macready said later. "There were no cottage lights after 10:00 or 11:00 p.m., no lights of any kind to steer by." (Newspapers the next day reported a severe storm raged and a tornado swept through Oklahoma and Kansas killing 12 people and injuring 80.)

The pilots changed positions at Missouri, Macready crawling back through the narrow passageway, Kelly coming up front. Dawn was breaking and the storm was abating—things were definitely looking up. However, over Illinois, their hopes were dashed once again when Kelly sent a note back to Macready, indicating a forced landing looked like a definite possibility, because of cracked cylinder jackets on the engine. The pilots again changed places, and Macready, now up front, noted conditions were, indeed, extremely bad. Water was shooting from both sides of the engine. About 50 miles from Indianapolis the engine temperature began to rise very rapidly, and Macready turned back to a field previously picked out for an emergency landing. Kelly was in back pouring everything liquid—drinking water, coffee, consomme—into the radiator, and with these additions, the airplane made it to the Indianapolis Speedway. The engine froze solid as they touched down.

When the pilots jumped out of the T-2 at Indianapolis, they were through—no more talking about transcontinental flights. They flew to Dayton and had a few days rest, but it wasn't long before the U.S. map once again went up on the wall in the pilot's lounge and before they knew it, they were planning a third attempt. ■

**To be continued in the October issue.**

*Sally Macready Wallace is the daughter of John A. Macready. She is the President of the Macready Foundation and is currently serving on the Board of Directors of Castle Air Museum at Merced, CA.*

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## Parks College

*Continued from page 8*

Tampico's with 7 more to come this fall. The schools also uses sophisticated Frasca flight simulators connected to air traffic simulators to give student pilots and controllers "experience" in the airspace environment. Its mechanic school develops skills in all engines and is teaching composite construction. It has its own wind tunnel in the Aerospace Engineering School for testing the design model each student of that school must develop and build. Recently, the college opened an avionics school for training in the development and repair of modern navigational equipment.

The school continues to add degree programs to reflect changes in the aviation industry and in business in general. In addition to its undergraduate degrees in Aeronautical Administration, Aerospace Engineering, Aircraft Maintenance Engineering, Aircraft Maintenance Management, Airway Science (five separate bachelors degree programs), Aviation Science/Professional Pilot, Avionics, Electrical Engineering, Logistics, Meteorology, and Travel and Tourism Management, Parks College also offers a Master's in Aerospace Engineering. In addition to numerous associate degree programs, the school has introduced two, new bachelors degree programs for 1993: Software Engineering and Applied Computer Science.

Dr. Baty describes Parks College as a "unique environment where students can have the best of both worlds—a quality, personalized education with the advantages of a large university." The faculty-to-student ratio is 1/14, and class size is usually less than 30 students. The Cahokia campus has over 1,000 students from 47 states and several foreign countries (19% of the students are foreign). The school also has a sister campus in Madrid, Spain.

In addition to receiving the first FAA (then CAA) approved school certification, Parks College is a frequent host of FAA safety seminars on campus, not just for its students but for the Cahokia and greater St. Louis communities. In 1986, Parks College was the first FAA Teacher Resource Center. Its safety relationship with the FAA is firmly grounded.

What, in all this, happened to Oliver Parks?

Ill health forced him to retire from the school's board in the late 1960's, although he was a sometime, familiar figure at school events—graduations and homecomings. In February 1985, having witnessed aviation from its birth and nursed its growth through to the space age, Oliver Lafayette Parks died, but, according to Dr. Baty, "his legacy has not. Parks College is alive and well.

"Down through the years, Parks College personified its founder. It reflected his vision, his genius, his capacity to see goals and to reach them, to anticipate the future, to know what lay beyond the edges of this earth, and to study the outer reaches of our universe. He stands in the pioneering tradition of famous aviators.

"Parks College is his monument."

No one could ask for a better epitaph. ■

*This article is based in large part on the book,* Parks College—Legacy of an Aviation Pioneer *by William Barnaby Faherty, S.J. Additional information came from Dr. Baty and Parks College's Office of Public Relations.*

# Suspected Unapproved Parts

*They may look the same, but. . .*

by the FAA Aircraft Certification Service

- ***Improperly** overhauled fixed-wing aircraft starters*
- ***Unauthorized** alteration of helicopter main rotor blades*
- ***Re-identification** of certain AN and MS fittings*
- ***Unapproved** 4½" bearing seal spacers*
- ***Counterfeit** marking, labeling, and packaging*

## WHAT CAN YOU DO TO PREVENT THEIR USE?

Unapproved parts may not be of the same high quality or be as fully compatible as those approved by the FAA. Unfortunately, unapproved parts are not easy to detect because those who manufacture and distribute them go to great lengths to duplicate materials, part numbers, and serial numbers to coincide with the approved parts.

To make matters even more difficult, some of these parts may be available from the same suppliers who provide parts to FAA Production Approval Holders under the original design. Therefore, without a detailed inspection or material analysis, unapproved parts can go undetected and enter the aviation supply system.

### Definition

An unapproved part is a part, component, or material—

- that has not been manufactured in accordance with the approval procedures in FAR § 21.305 or repaired in accordance with FAR Part 43;
- that may not conform to an approved type design; or
- that may not conform to established industry or U.S. specifications (standards parts).

Such unapproved parts may not be installed on a type certificated product, unless a determination of airworthiness can otherwise be made.

Examples of unapproved parts include, but are not limited to:

- "counterfeit" or fraudulently marked parts, components, or materials
- parts shipped directly to users by a manufacturer, supplier, or distributor who does not hold or operate under the authority of a production approval for the part; e.g., parts that the manufacturer produces in addition to those authorized by the production approval holder
- parts that have been maintained or repaired and returned to service by persons or facilities not authorized under FAR Part 43 or 145

### Who is Responsible for Airworthiness?

The performance rules for replacement of parts and materials used in the maintenance and alteration of U.S. certificated aircraft are specified in FAR §§ 43.13 and 145.57.

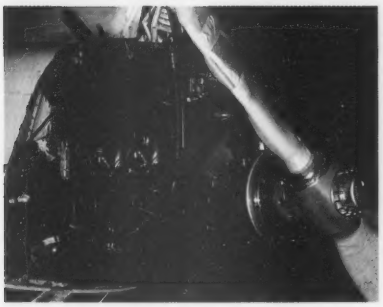
Continued airworthiness of the aircraft, which includes the replacement of parts, is the responsibility of the owner/operator per the requirements of FAR §§ 91.403, 121.363, 125.243, 127.131, and 135.413.

To ensure continued safety in civil aviation, it is essential that great care be used when inspecting, testing, and determining the acceptability of all parts and materials. Particular caution should be exercised when the identity of parts, materials, and appliances cannot be established or when their origin is in doubt.

### How Unapproved Parts Get Into the System

Most aircraft parts distributors, aircraft supply companies, aircraft electronic parts distributors, etc., are not subject to certification or surveillance by the FAA. They are not required to establish the airworthiness of parts they advertise and/or sell.

In some cases subcontractors have overproduced a production approval holder's part, and these subcontractors later offer the surplus parts to a distributor, repair station, or airline as replacement parts. These parts are



usually cheaper and delivered faster than if purchased from the authorized manufacturer. As a result, these parts bypass the certificated production approval holder's quality control system and become "unapproved parts." New components or parts may be manufactured for the production approval holder but fail to meet the approved design; they, too, can enter the spare part distribution system.

Used life limited parts may be offered for sale with falsified records. This makes it difficult to determine or verify the actual time remaining limits for safe operation. These parts usually come from a cannibalized or damaged aircraft. Life limited parts that have exceeded their time limit or that have nonrepairable defects are sold to part dealers where they are reworked or camouflaged to give the appearance of being serviceable. A salvaged part may be accompanied with a counterfeit operating history or records that falsely account for its life limits.

Inadequate mutilation of unsalvageable and life limited parts by aircraft repair stations or owners/operators allow some of these parts to be cosmetically doctored for resale. Inadequate methods of mutilation may include marking, spray painting, hammering, or identification tagging. Failure to remove and report data plates from aircraft or components when declared unsalvageable may also allow their reuse. These data plates should be removed and the information reported to the FAA.

An FAA-approved part or standard part (manufactured to an industry or U.S. specification) illegally modified by an aircraft replacement parts distributor/broker would also be considered an unapproved part.

## Guide to Detection of Unapproved Parts

Procedures should be established before purchasing parts to establish qualified suppliers who are authorized to manufacture or distribute FAA approved parts. The following criteria would help to identify and screen out potential unapproved parts suppliers:

1. The quoted price or the advertised price is significantly lower than the price quoted by other suppliers of the same part.
2. A delivery schedule that is significantly shorter than that of the same part when existing stocks have been depleted.
3. The inability of a supplier to provide substantiating data demonstrating the conformity of the part.
4. The inability of a supplier to provide evidence of FAA approval for the part.

## Regulation and Guidance

An approved aeronautical part conforms to an FAA type design and is in condition for safe operation because of—

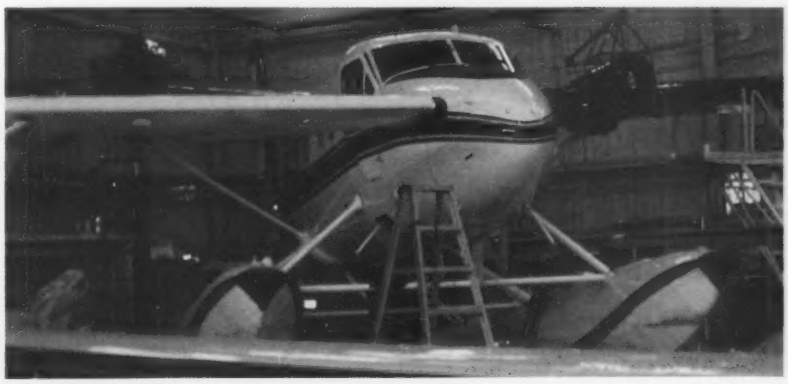
- FAR Part 21, Certification Procedures for Products and Parts, specifically:
- FAR § 21.125, Approved Production Inspection System
- FAR § 21.143, Production Certificate
- FAR § 21.303, Parts Manufacturing Approval, Standard Parts
- FAR § 21.305, Approval of Materials, Parts, Processes, and Appliances
- FAR § 21.500, (Import) Approval of Engines, Propellers
- FAR § 21.502, Materials, Parts, and Appliances
- FAR § 21.605, Technical Standard Order Authorization
- Authority and responsibility to repair and install approved parts:
- FAR Part 43, Maintenance, Preventive Maintenance, Rebuilding, and Alteration
- FAR Part 121, Certification and Operations: Domestic, Flag, and Supplemental Air Carriers and Commercial Operators of Large Aircraft
- FAR Part 127, Certification and Operations of Scheduled Air Carriers with Helicopters
- FAR Part 135, Air Taxi Operators and Commercial Operators
- FAR Part 145, Repair Stations

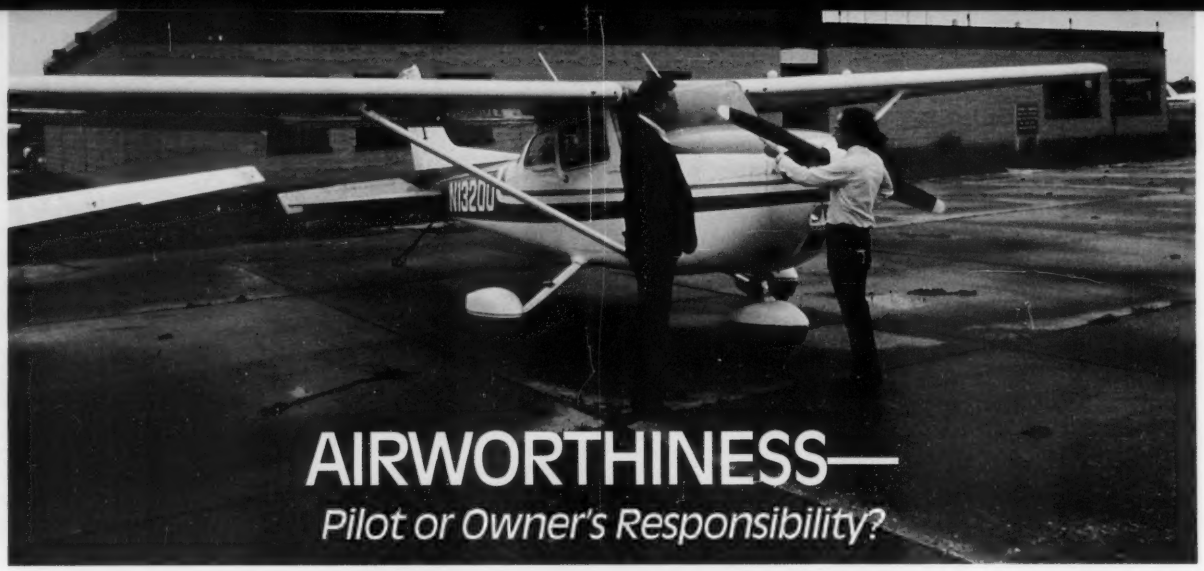
Aeronautical replacement parts not produced, repaired, or installed in accordance with the above requirements are questionable because the parts' approved design and quality are unknown.

***Guidance includes:***

1. Advisory Circular 21–29, Detecting and Reporting Suspected Unapproved Parts
2. Advisory Circular 20–62, Eligibility, Quality, and Identification of Approved Aeronautical Replacement Parts

*Continued on page 25*





# AIRWORTHINESS—
## *Pilot or Owner's Responsibility?*

by Donald E. Small, *Aviation Safety Inspector*

We've all heard of the pilot's "prerogative" which is effectively nothing more than a demonstration of good judgement. It's the ability to make a decision which assures the safest possible continuation of the flight. Good judgement guarantees the positive aspects of flying, the ability to preflight your aircraft, go flying, and return to earth safely.

In the process of becoming a certificated pilot, training may be accomplished by a well-qualified, FAA certificated flight instructor and/or may be part of an approved school's programmed curriculum. Consider this: Most new pilots entering aviation are not skilled in the maintenance of aircraft and are not expected to be. They also may not be aware of the contents of the aircraft, engine, and propeller logbooks, what the documents represent, or what they should contain.

Whose responsibility is it to know that the aircraft has had a recent 100 hour/annual inspection and that all Airworthiness Directives (AD) have been complied with?

Where in the "pilot training curriculum" are aircraft preflight inspections covered, and how much time is dedicated to this process?

The answer to the second question is found in Advisory Circular (AC) 141–1, "Pilot School Certification." Among other things, this AC explains the required time and subject matter for the private pilot course. A closer look in the AC will reveal that Lesson No. 5 is a "two hour" course that covers airplane structures, propellers, engines, hydraulic systems, electrical systems, pitot static and vacuum systems, and the magnetic compass.

The subject matter is certainly all inclusive; however, the amount of material would seem to be too great to cover and comprehend thoroughly in such a short amount of time. Is a two-hour lesson enough to gain the experience necessary to make a judgement call for airworthiness? And what about those who learn from a FAR Part 61 school, where curricula are not approved nor required by the FAA ?

The answers can be found in the regulations, namely FAR §§ 39.3, 91.7, 91.403, 91.405, 91.407, 91.409, 91.411, 91.413, and 91.417.

A quick review of these FAR would reveal language that states either "No person may" or "each owner or operator shall." It's important to understand exactly "whom" these regs apply to. That is, if you were to look up "person" in FAR Part 1, you would find that it reads as follows:

"Person means an individual, firm, partnership, corporation, company, association, joint stock association, or governmental entity. It includes a trustee, receiver, assignee, or similar representative of any of them."

So you can see that the "owner/operator" as well as the pilot of the aircraft is indeed included under the umbrella of this definition.

Okay, so now that we know these rules apply to pilots, what basic responsibilities go along with them?

The best place to start might be with the definition of the term "airworthy." Now most would probably agree that the term means "safe for flight;" however, that's only half of it. The remainder of the definition is generally the one that gets most folks into trouble, and that is that the aircraft conforms to its FAA approved type design data. In addition, close examination of the aircraft's airworthiness certificate will reveal that it is effective as long as the aircraft is maintained in accordance with FAR Parts 21, 43, and 91. Therefore, a pilot performing a preflight needs to consider many things in evaluating whether or not an aircraft is airworthy.

The obvious issue here is the "safe for flight" condition of the aircraft. No one in his or her "right mind" would want to fly away in an unsafe aircraft, so this condition is probably always observed.

The not-so-obvious other issues here deal with conformity to the type design data and the aircraft's being maintained in accordance with the appropriate regulations. In meeting these conditions, the aircraft must have had all required inspections and maintenance accomplished, including AD's, and must have been returned to

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service in its original or "properly altered" condition by a person authorized in FAR § 43.7 (FAR §§ 91.407 and 91.409) As for conformity to its type design the aircraft must conform to its original or properly altered condition, and that includes all installed components, accessories, and replacement parts.

**Preflight—Records**

So, how does one verify all of the above, you ask? Enter FAR Part 91, Subpart E, "Maintenance, Preventive Maintenance, and Alterations," specifically maintenance record keeping requirements. Part of the "preflight requirements" should include reviewing the aircraft's maintenance records and within these records you will find out whether all required inspections have been accomplished. These should include the 100-hour/annual inspections, and the 24-month recurring altimeter and transponder inspections, and the ELT battery inspection interval, as appropriate and if the aircraft is so equipped. (Refer to FAR §§ 91.207, 91.409, 91.411 and 91.413 for more detailed information.)

The records would also indicate to the pilot whether any open maintenance entries exist. An aircraft with an "open" maintenance item is technically "unairworthy" unless it is repaired or deferred via FAR § 91.213 or a minimum equipment list (MEL).

AD accomplishment is checked via the records and is usually contained on a separate "AD Compliance List." This list, if properly completed, will identify each applicable AD and state the "next time due." The "persons" who own, rent, or lease an aircraft must know if AD's have been complied with and when any additional inspection is due.

**Preflight—Aircraft**

The more familiar phase of the preflight inspection is of course the "walk around" where the pilot looks for obvious damage that in his or her mind would "affect safety." Let's stop here and review another regulatory requirement.

FAR § 91.405, with the exception of paragraph (c), requires that all discrepancies must be repaired between inspections in accordance with FAR Part 43. FAR § 43.13 states in part that the aircraft must be returned to service after maintenance in its "original or properly altered condition."

So there you are looking at that dent you've seen numerous times and that you know hasn't affected the safety of the aircraft. As a matter of fact, it's been flying like that for years. Don't be fooled into thinking the airplane's airworthy for those reasons alone. To take that aircraft is to assume the liability for flying it in an unairworthy condition. When in doubt, check with a mechanic, who will be in the best position to judge the extent of the dent.

Part of the reason for offering this information is that pilots and owner/operators are often unaware of their responsibilities regarding aircraft airworthiness. Most pilot recurrent and upgrade training is lacking when it comes to airworthiness. Hopefully, this article will help to bridge that gap.

As a pilot you may now know enough to ask the right question the next time you talk to your mechanic. Adhering to the above in performing your preflight and checking with your mechanic for any observed deficiencies will go a long way in keeping you safe—and out of trouble. ■

*Mr. Small is an airworthiness inspector in FAA's Flight Standards District Office in Bedford, MA. This article originally appeared in the April 1993 issue of* "FSDO 1 Communicator," *the newsletter published by Bedford's Accident Prevention Program Manager, John F. Hemmes.*

# A Few Remarks about *Surface Weather Observations*

by Richard McDonald

Several jump-seat rides ago the Captain of the flight handed me a computer print-out of a surface weather observation from ATL.

ATL SA 1351 CLR 3 262/39/28/ 0305/029/ SFC VSBY 7 TWRINUN

The Captain asked me what does the remark TWRINUN mean? I guessed it had something to do with the surface visibility; however, like everyone else on the flight deck who never saw the remark before, I did not know what information the surface observer was trying to relay to the aviators.

The crew and I knew the Atlanta aerodrome, and knew the control tower and weather office were about fourteen floors above the surface. At that time, the weather office was about one-half mile north of runway 26R and on a line normal to the control tower, but none of us could connect surface visibility with INUN. The crew and the aircraft, an L1011, were CAT 3 qualified; the weather at landing was CLR 7 271/37/28/3206/031, well above everyone's minimums. The aircraft was landed and everybody went home.

About a month later, I visited the ATL weather office and found out that the remark TWRINUN means "tower in unknown." This remark was added to the ATL observation because the control tower determined the surface visibility was lower than the weather office had determined it to be, and according to paragraph 2.13.5 page A3–16, of the *Federal Meteorological Handbook Number 1,* "If the tower visibility is 3 miles or less and the surface visibility is 7 miles or more, enter the reason for the tower's reduced visibility. . . ." On the day and the hour of the TWRINUN observation, the weather office could not determine why the control tower could not see as far as it could and was required to affix the remark TWRINUN at the end of the observation.

As a refresher course for people in the aviation industry, I put together 50 remarks commonly used in surface observations along with their meaning. So if you have 20,000 hours at the yoke or 20,000 hours at the boards and never saw the remark before, welcome to the review.

### Surface Weather Observation Remarks

**1. /FEW CU**
Few Cumulus (less than 1/10 covering the sky).

**2. /HIR CLDS VSB**
Higher clouds visible through breaks in the overcast.

**3. /BINOVC**
Breaks in the overcast not classified as thin.

**4. /BRKS N**
Breaks or an area absent of clouds in a layer below 1,000 feet which covers 6/10 but less than 10/10 of the sky.

**5. /BKN V OVC**
Broken layer variable to overcast.

**6. /CIG 14V19**
Ceiling variable 1,400 to 1,900 feet (used only when the ceiling is below 3,000 feet).

**7. /ACCAS ALQDS**
Altocumulus castellanus clouds all quadrants.

**8. /ACSL SW–NW**
Altocumulus standing lenticular clouds southwest through northwest.

**9. /VIRGA E–SE**
Vertical or inclined trails of precipitation attached to clouds but not reaching the surface east through southeast.

**10. /CUFRA W**
Cumulus factus clouds west.

**11. /TCU N–E**
Towering Cumulus north through east.

**12. /K20 SCT**
Scattered layer of smoke at 2,000 feet above the surface.

**13. /IC4**
Ice crystals obscuring 4/10 of the sky.

**14. /PRESRR**
Pressure rising rapidly (at a rate of 0.06 inch or more per hour, e.g., 29.92 to 29.86).

**15. /WND 23V33**
Wind direction varying from 230 to 330 degrees. The variation must be 60 degrees or more during the period of the observation and the wind speed must be more than 6 knots).

**16. /RADAT 87120**
Contraction for freezing level data. (The first two numbers indicate the relative humidity at the freezing level; the last three numbers indicate the height, (MSL), in hundreds of feet of the freezing level. e.g., 12,000 feet MSL).

**17. /RADAT ZERO**
This means the freezing level, zero degrees centigrade, was at the surface or below it.

**18. /F5 TWR VSBY 2**
Fog obscuring 5/10 of the sky, the control tower determined the surface visibility to be 2 miles.

**19. /CB MOVG E RWU E**
Cumulonimbus moving east, rain showers of unknown intensity east.

**20. /TB08 S MOVG E OCNL LTGIC**
Thunder began eight minutes after the hour; the sound of thunder was south moving east with occasional lightning in the cloud where the thunder was heard.

**21. /TB10 N MOVG N FQT LTGCCCA**
Thunder began ten minutes after the hour it was north moving north with frequent lightning cloud to cloud and cloud to the atmosphere.

**22. /T S MOVG W OCNL LTGCGCW**
Thunder was south moving west with occasional lightning cloud to ground and cloud to water.

**23. /VSBY ¼V1 SB50 PRESFR**
Surface visibility variable between ¼ of a mile and 1 mile. (The remark is used only when the prevailing visibility is less than 3 miles and varies by one or more reported values.) Snow began falling 50 minutes after the hour; the pressure was falling rapidly—at a rate of 0.06 inch or more per hour. e.g., 29.92 to 29.86.

**24. /WSHFT 33**
The wind shifted at 33 minutes past the hour.

**25. /KOCTY**
Smoke over the city.

**26. /CBMAM 10W MOVG SE**
Cumulonimbus Mama 10 miles west moving southeast.

**27. /LWR CLDS APCHG STN**
Lower clouds approaching the station.

**28. /SFC VSBY ½**
Surface visibility (visibility at the weather station) ½ mile.

**29. /LOWEST PRES 631 2345**
The lowest sea level pressure in tens, units and tenths of a millibar and the time of occurrence (963.1 millibar recorded at 2345 GMT)

**30. /PRJMP 8/1012/18**
Pressure jump, 8 was the magnitude of the jump to the nearest 0.01 inch omitting the decimal and zeros preceding the first significant digit. The time in hours and minutes when the jump began and the time in minutes when it ended follow.

**31. /FUNNEL CLOUD B16E19 NW DSIPD**
A funnel cloud was first seen at 16 minutes after the hour and last seen at 19 minutes after the same hour northwest of the station where it dissipated.

**32. /TWRINUN**
Control tower in unknown.

**33. /TWRINC**
Control tower in the clouds.

**34. /TWRINK**
Control tower in a layer of smoke.

**35. /TWRINH**
Control tower in a layer of haze.

**37. /TWRINP**
Control tower in precipitation.

**38. /AB13E20 HLSTO ½**
Hail began falling at 13 minutes after hour and ended 20 minutes after the same hour; the size of the hail stones were ½ inch in diameter.

**39. /SU N**
Snow of unknown intensity falling north.

**40. /SHLW GFDEP 4**
Shallow ground fog 4 feet deep.

**41. /DRFTG SNW**
Drifting snow (height less than 6 feet in depth). Do not confuse with blowing snow, BS. Blowing snow, BS, is when the snow is lifted by the wind to moderate or greater heights, visibility is 6 miles or less and the sky may become obscured when the snow is raised to great heights. BS is always reported in the body of the observation right after the visibility e.g. SA W1X 1/16BS.

**42. /RWU E–S**
Rain showers of unknown intensity

**43. /WET SNW**
Wet snow (snow that contains a great deal of water).

**44. /SNOINCR 1/4/8**
Snow depth increase in the past hour, 1= one inch of new snow in the past hour, 4= four inches of new snow since the last six hourly (00Z, 06Z, 12Z, and 18Z are six hourly observation times), 8= total snow on the ground in inches.

**45. /PCPN 103**
Fallen precipitation exceeded ½ inch (water equivalent) during the past hour, 103= 1.03 inches.

**46. /F BANK N–S**
Obscuring phenomena at a distance. Fog bank north through south not at the weather station (airport).

**47. /TE55 MOVD E AB12E52 HLSTO ¾ PK WND 3548/20**
Thunder moved east and ended 55 minutes past the hour. Hail began 12 minutes past the hour and ended 52 minutes past the hour; the hail stones were ¾ of an inch. The peak wind "PK WND" is the greatest peak wind in excess of 35 knots observed or recorded during the hour of the observation. In the example above the peak wind occurred 20 minutes past the hour, the wind was from 350 degrees, the speed 48 knots.

**48. /VSBY NW½S2**
When the visibility sector is less than 3 miles or when it is operationally significant and differs from the prevailing visibility, it is disseminated as a remark. In the example, visibility in the northwest was ½ mile, and in the south it was 2 miles.

**49. /OCNL RW**
The precipitation falling, in this example rain showers, was varying in intensity during the period of the observation.

**50. /ROTOR CLOUDS S**
Rotor cloud south.

Always read every item in a surface weather observation in the past tense. e.g., was seen, was heard, were falling. For example, at 1351 the sky *was* clear, the prevailing visibility *was* 3 miles, the sea level pressure, temperature, dew point,wind, altimeter *were* 262/39/28/0305/029, the surface visibility was 7 miles, the control tower *was* in an unknown phenomena and so on.

**Additional Explanatory Notes**

The following cloud types are especially important and should be reported whenever the pilot sees them; they are listed in remarks 7, 8, 19, 26, 31, and 50.

**Altocumulus Standing Lenticular,** ACSL, (Standing means almost stationary) look like smooth lenses or almonds. They are the result of lee waves (barrier in the wind flow, a mountain) and are associated with turbulence.

**Cirrocumulus Standing Lenticular,** CCSL, is also associated with lee waves and turbulence. CCSL is higher up in the atmosphere than ACSL and it is white throughout, ACSL has shadowed parts.

**Cumulonimbus Mama,** CBMAM, this cloud has hanging protuberances, like pouches on the under surface of the cloud (easy to identify). The cloud is associated with turbulence.

**Funnel Cloud** is a cloud column or inverted cloud cone pendent from cumulonimbus or cumulus, mostly cumulonimbus. If the funnel reaches the ground or water it is classified as a tornado or waterspout respectively.

**Rotor Cloud,** sometime called roll cloud, is a turbulent cloud found on the lee of some large mountain barriers. The air in this type of cloud rotates around an axis to the mountain range and is associated with turbulence. Rotor Clouds are lower in the atmosphere then CCSL and ACSL.

The examples in remarks 12, 13, 18, and 28 are given further explanation below.

**Remark 12:** In the remark K20 SCT, K is the obscuring phenomena (smoke) aloft, 20 is the height above the ground, and SCT is scattered. The observer wants you to know its a layer of smoke, so the next time you see XYZ SA 0150 20 SCT 15 123/23/20 /0205/999/ K20 SCT you will know the 20 SCT is a layer of smoke and not a layer of clouds.

**Remark 13:** IC4 is used when 1/10 to 9/10 of the sky is obscured by ice crystals. When the sky is partially obscured, 1/10 to 9/10, by surface based phenomena (see the list below) a –X is disseminated at the beginning of the observation. e.g., XYZ SA 0150 –X 20 SCT 15 123/23/20/0205/999/IC4. The 4 after IC is the amount of sky obscured by the ice crystals.

Here is the list of other types of surface base phenomena that could obscure the sky.

**L** Drizzle any form and intensity including frozen drizzle ZL

**R** Rain any form including RW and ZR

**S** Snow any form including SW, SP, and SG ( showers, pellets, grains)

**BS** Blowing Snow

**BY** Blowing Spray

**F** Fog any form including GF and IF (G = ground, I = ice)

**D** Dust including blowing dust

**H** Haze

**N** Sand including blowing sand

**K** Smoke

**Remark 18 and 28:** When the control tower and the weather station have visibility values that differ and either or both are 3 miles or less, the location where the highest visibility was observed and that value are disseminated in the remarks section of the observation. e.g., XYZ SA 0150 -X 20 SCT 11/2F 233/44/33/2205/999/ F5 TWR VSBY 2. In this example, the weather office determined the **prevailing visibility** to be 1½ miles and the control tower determined it to be 2 miles; therefore, the TWR VSBY 2 was added to the observation as a remark. The lower visibility determined by the weather office was place in the body of the observation and used as the prevailing visibility.

Prevailing visibility is the greatest visibility equaled or exceeded throughout at least half the of the horizon circle, which need not necessarily be continuous. The number after the surface based obscuration, in this example fog (F5) can be any number from 1–9, indicating 1/10 to 9/10 of the sky is obscured.

Another note about surface weather observation rules: The Air Force, Army, and Navy have observation rules that differ from civilian rules. If you are a weekend warrior, check with the Base or Post Weather or Aerology Office before you assume.

That said, I leave you with the last example and one question. It is 1610Z, you are on a 15 mile final for runway 27, here is the 1551Z observation, XYZ SA 1551 M2 BKN 15 OVC ½TRW 123/90/75/2515G20/999/ TB45 S MOVG N

Where is the thunderstorm now? ■

*This article was originally printed in the Delta Air Lines' Up Front in 1990 under the title "999 Remarks." Mr. McDonald is a pilot and an Air Traffic Control System Command Center Meteorologist for the FAA.*

# The One Moose Airplane

by John Steuernagle

*The author of this piece was a flight instructor and charter pilot (and a fine one of both) at an airport where I worked on and received several certificates and ratings. The airport has been replaced by the modern-day bane of pilots—the housing development—but the lessons I and hundreds of others learned there I carry with me every day on every flight I make. The anecdotes provided here contain some of those lessons that we can pass on to others who didn't have the wonderful opportunity to learn at a little airport in Northern Virginia we called "Woodbridge International."* ***—Editor***

Some time ago I was asked to speak at an FAA seminar—topic to be my choice. I chose complacency. I didn't get around to choosing a title for the presentation, so the Accident Prevention Program Manager did it for me: "Some Thoughts for Those Who do not Intend to be Involved in an Accident." The title didn't appeal to me at first, but the more I thought about it the more sense it made. Nobody intends to be involved in an accident, but we have them just the same, and the pilot is usually at fault. It's often easy to see what went wrong after the fact, especially if the pilot survives. Knowing when things are about to go to pieces is more difficult. Hence, the following

### *THE ONE MOOSE AIRPLANE*

The story is told of an Alaska bush pilot who contracted with a group of hunters to transport them and their gear to a remote lake. They agreed that the pilot would return in 10 days to fly the hunting party back to civilization. The pilot was as good as his word, and 10 days later he taxied up to the dock where the hunters had assembled their gear and trophies.

Looking over the cargo, the pilot announced, "You fellas have a problem here. I know I told you when I dropped you off that this is a one moose airplane. You've got two moose here, so you'll have to leave one behind."

The hunters were understandably reluctant to abandon half of their trophies. They tried to reason with the pilot with arguments like, "They're unusually small moose, don't you think?" and "They were a matched set. We can't take one without the other."

The pilot stood his ground, countering, "In the first place I'll grant you that some moose are smaller than others but there's no such thing as a small moose. I'm sorry about the matched set, but you were told that this is a one moose airplane. Now, if you'll just agree on which moose to leave behind, we'll be on our way."

In an attempt to appeal to the pilot's avarice, the hunters said, "If it's a matter of money, we're willing to pay."

"It's got nothing to do with money," the pilot said, "It's a problem of weight and balance and airplane performance; the length of this lake, the obstruction on the shore, and a number of other things, such as density altitude. All of which add up to one thing: Flying out of here with two moose is unsafe, and I'm not about to do it at any price. Now, if you'll just pick the lucky moose, we'll get it into the airplane and be off."

Not to be dissuaded, the hunters voiced the ultimate argument, "Oh, all right. If you don't think you can do it, we'll have to agree, but your friend Joe flew us out of this very spot last year with two moose that were bigger than these."

Knowing that Joe flew the same type of airplane, the pilot reconsidered his decision, "Joe flew you out of this lake last year?"

"Yep."

"With two moose?"

"That's right, and they were lots bigger than these scrawny things."

The pilot thought for a moment, then said, "Load 'em up. We'll give it a try."

The floats were nearly under water as they staggered away from the dock. The pilot taxied the airplane to the downwind end of the lake and circled at full throttle, going a little faster with each turn. At last he headed for the far end of the lake and at the last possible moment, the airplane crawled into the air. They flew no more than a foot or so above the water, in what I guess you would call "lake effect," but the airplane didn't climb. Presently the lake ended, and they crashed into some low scrub growth near the tree line.

Everyone survived with minor injuries, but the pilot was knocked unconscious. When he came to, in a daze he asked, "Where are we?"

One hunter looked back toward the lake and then at the tree line. "I'm not absolutely sure," he said, "but it looks as if you got us about a quarter mile further than Joe did last year."

**What Went Wrong**

It's easy to see where our pilot went wrong. The concept of pilot-in-command is important, and it means just what it says. We can't allow passengers to influence our command decisions. The pilot in the story was being paid to make those decisions. He was the only one qualified to make them, and he did a pretty good job, too, until he heard about Joe. Then, a macho, I-can-do-it attitude surfaced. He wasn't about to let Joe show him up.

The thing to remember here is this. There will always be someone who makes it through, who takes off in terrible weather, or overloaded—you name it. That's no reason for us to compromise what we know is right. We must show our students by word, which is easy, and by example, which often is not so easy, that we make our decision in light of all available information. Then, we stand by those decisions. Of course, we have to be flexible enough to modify our plans to accommodate changing conditions.

With the exception of the One Moose Airplane story, all of the events described in the following pages are true. they come from my personal experience and that of others well know to me. As you read these stories try not so much to understand what went wrong, which is easy enough; but why the pilot made the decisions that led to the incident. Look for early indicators that point to trouble and see if some of the attitudes described mirror your own or your student's or your friend's.

## *THE SOLO CROSS COUNTRY FLIGHT*

In order to understand what went wrong on my second student pilot solo cross country flight, it's necessary to tell you a little bit about my first one. It was almost 25 years and 8,000 hours ago when I made my first solo flight from DuBois, PA to Franklin, PA. I had spent most of the night before planning in exquisite detail each checkpoint along the way. The morning of the flight I computed and double checked the courses, constructed a detailed flight log, and filed my flight plan. The flight itself was perfect. I hit each checkpoint just as planned and arrived at Franklin in the very minute I had predicted an hour before. The return flight was just as wonderful, and I left the airport filled with pride in my accomplishment and feeling as if I were just about the best student pilot there ever was. This cross country flying business was easy.

The second solo cross country flight was planned from DuBois to Johnstown, PA, about 60 miles south. Looking forward to the day when I would be a full fledged private pilot, I asked my flight instructor to permit a landing at Ebensburg, PA on my way to Johnstown. There were a couple of airplanes for sale there, and I wanted to take a look at them. My instructor agreed, and I booked the airplane. My planning for this flight was almost as exhaustive as that for the first. Each checkpoint was selected with care and the dead reckoning calculations were checked and rechecked. There was a VOR on the Johnstown airport but, in my mind, VOR was for those who were unsure of their pilotage skills. I knew it was available but I didn't plan to use it.

The flight from DuBois to Ebensburg was just was wonderful as the first solo cross country flight to Franklin. I arrived precisely at the time predicted on my flight log and strode off in search of bargain airplanes. Then, as now, there are no bargain airplanes, but I enjoyed the tire-kicking experience and presently found myself number two for the runway, waiting my turn to launch for Johnstown about 10 miles away.

The trip should have taken about five minutes. My first clue that all was not right with the world came about 10 minutes out of Ebensburg. I knew Johnstown should be dead ahead, but there were no airports between me and the horizon. "Must be one heck of a headwind," I mused and pressed on.

Fifteen minutes out of Ebensburg and still no Johnstown. "It's a good thing I'm so experienced," I thought. "Other students might not recognize the terrific wind. All the same I'll have a word with Flight Service when I get on the ground. Their winds aloft forecast was really off."

Just then I spotted Johnstown right in front of me and about 10 miles away. I radioed the FSS for an airport advisory and began my descent into the ferocious headwind. Nearing the airport my keen senses detected an

anomaly. "What do you know," I thought, "There are only two runways at Johnstown, and the chart indicates three. They must be planning an addition and somehow it's already charted. Now that could be really confusing."

This last bit of evidence finally caused me to question my position, and I called Johnstown to ask how many runways they had. "Three," they replied. "Why do you want to know?"

Admitting that my position was temporarily in doubt elicited an impressive offer of flight assist options from Flight Service, who were no doubt prepared to scramble a flight of interceptors from Pittsburgh if they felt it would help in getting this incompetent student out of the sky without doing damage to himself or others. I declined their offer for the time being, extended my flight plan, and got very busy in the cockpit. For the first time in the flight I tuned and identified Johnstown on the VOR receiver and took up the heading indicated. It was a relatively simply task to navigate to Johnstown after visually confirming my position over the famous horseshoe curve of the Pennsylvania Railroad near Altoona.

### What Happened

As many of you will have guessed, I shut the airplane down on one heading at Ebensburg. Later we moved the plane to another heading beside the hangar, and when I started the airplane again, the heading indicator was incorrect. A casual attitude toward the pretakeoff checklist allowed me to omit the setting of the heading indicator and voila! I was on my way to Altoona.

### Why What Happened Happened

I was so embarrassed by this incident that years passed and I had students of my own before I could discuss it with anyone other than my amused flight instructor. It was my first brush with cockpit complacency and, in retrospect, it couldn't have come at a better time.

Complacency has many faces, but it is often simply an expectation of success. I didn't expect to have any difficulty navigating 10 miles to Johnstown. After all, I'd just come almost 60 miles to get to Ebensburg. Impressed with my flying ability and skill, I took a casual attitude toward the checklist and missed an important item. A small error, and with plenty of fuel on board and good weather, embarrassment was the worst I had to suffer. But the same error before an instrument takeoff has led to unsurvivable encounters with obscured terrain, sometimes known as "cumulogranite."

### THE CHECK-OUT

Another face of complacency is a lack of respect for the airplanes we fly. This may come from over-familiarity with the machine or may indicate the way the pilot views most things in life. Either way it can have some interesting consequences. There are some indicators that flight instructors can use to identify potential attitude problems. One of the most reliable indicators I've found is the adjective "Li'l Ole." Just about every pilot I've flown with who referred to his or her airplane as a li'l ole Cherokee, Baron, or even li'l ole King Air was, at the best, sloppy and, at the worst, downright dangerous.

One memorable check-out involved flying with an itinerant airplane salesman who was amazed that our company would require him to check out in our rental planes. After all, he was just going to take his girlfriend for a li'l ole airplane ride. As we went through the preflight inspection, I discovered that he had flown a Cherokee "once or twice" but preferred his li'l ole Baron back home. As the three of us piled into the airplane and headed for the runway, the salesman made me aware that because of his "tight schedule" he couldn't afford to spend the whole morning on this "check-out thing."

The pilot was sloppy but not particularly dangerous. I noted, with interest, that he flew all the maneuvers with his feet flat on the floor. I knew if I were uncomfortable sliding around in my seat, the woman in the back must be feeling the strain as well. I asked the pilot if he had most of his time in "li'l ole" LearJets. "Well, no, not really," he said, "only a couple of hours. Why?"

"Oh, just curious," I said. "I thought a lot of jet time would explain your lack of coordination."

His rudder control improved markedly after that, and we successfully completed the check-out.

A word of caution here: It's much easier to identify complacent attitudes in others than it is to see them in ourselves. Instructors strive to project calm and competence, and that's good. We need to listen to what we're saying from time to time though, and we need to make absolutely clear our profound respect for flying.

### THE CHECKLIST

When I first started flying charter, our company's insurance required 100 hours of multi-engine time before a pilot could be designated as a charter captain. With about 98 hours of multi-engine flying logged, a flight instructor in our employ scheduled his first charter check ride with an FAA inspector at a nearby airport. Because the would-be captain didn't meet the insurance requirements, our chief pilot went along for the ride.

The oral portion of the check gave the FAA inspector ample opportunity to evaluate the pilot's personality as well as his knowledge. He was quite capable but also arrogant to a fault. when the questioning came to checklists, he correctly answered that the aircraft operator was required to provide checklists for normal and emergency operations. He added, incorrectly, that the pilot was not required to use them. The inspector probed deeper, "Are you sure you don't have to use those checklists?"

"Absolutely," he replied, "I've committed the checklists for all the airplanes I fly to memory. That way I can keep my head where it belongs—out of the cockpit, scanning for traffic."

The flight portion of the check was not successful, and the pilot was encouraged to try it another day. Needless to say, tension was high on the flight home. The pilot was furious with the inspector and went to great length to explain her inadequacies to our chief pilot. "I know she busted me on that checklist thing, and I know I'm right. I've never used checklists. That's what my memory is for!"

The long-suffering chief pilot nodded and said, "I couldn't agree with you more. I've always maintained that checklists are for the weak-minded. By the way, do you think we'd go any faster if you raised the landing gear?"

**Familiarity Breeds Contempt**

Most of us have some mindless, routine activities in our lives—a morning waking, bathing, shaving (for some!) ritual, for example, that we can, and sometimes do, do in our sleep. The same is often true with checklists. A new or complex airplane demands our complete attention, and we're grateful for the checklists provided. But even the most complicated machine becomes too familiar after a while, and that's when we most need to have a checklist and to use it. Unfortunately, that's also when we may feel so comfortable that the checklist becomes more of a bother than an important component of the airplane.

Students, always quick to mirror their instructor's habits, will note how we approach flying the training airplanes in the fleet. If we rely on memory to configure these airplanes for flight, no amount of urging will persuade our students to use the checklist. If we don't insist on a thorough line check before each flight, they won't either. As soon as they're able, they'll fly the way their instructor does. Once again our actions speak louder than our words. We must set the example every flight, every day.

***A TALE OF TWO PILOTS***

This story happened some time ago, but I've remembered it all these years because the pilots involved made two different decisions based on the same information. One was a VFR renter pilot who flew regularly at our airport and who often took one- or two-day cross country flights. The other was a young corporate pilot employed by a construction firm. He was responsible for a nearly new Beech Baron, and he took his job very seriously. The aircraft, lavishly equipped with good avionics, anti-ice, and weather avoidance gear was kept in top shape and clean as a whistle.

The renter pilot, his wife, and another couple had just taken off on a day trip to Atlantic City when the corporate pilot landed with his boss and two associates. They would spend the day in the city and leave for home in late afternoon. It was a typical July day in Washington, DC: hot in the morning with the promise of rising temperatures throughout the day. Relief in the form of a fast-moving cold front was expected in the early evening, and that was causing the corporate pilot some concern.

Over lunch he explained to me that his boss was on a very tight schedule and had to be home for an important meeting first thing in the morning. Leaving on time was imperative, but that would involve penetrating the approaching front. The pilot knew that severe weather was likely to accompany the front and dreaded having to delay his boss' departure. He told his boss the longer they waited to depart the more likely they would encounter thunderstorms enroute. The boss agreed to call the pilot for a weather update before leaving the job site.

The pilot checked the weather every hour throughout the afternoon, and as the day wore on, the front became more and more active. By the time his boss called, a well-developed squall line had formed along the front, and even though the weather was fine at the departure point, it was impossible to conduct flight safely.

The pilot was rightfully concerned. Corporate jobs can hang in the balance of go/no-go decisions, and he knew his boss had to get home. I only heard half the conversation, but it was obvious that his boss was upset, asking the pilot to explain why they had spent all that money on radar if they couldn't fly in thunderstorm weather. Nevertheless, the pilot prevailed, and it was agreed that they would leave at dawn the next morning. Arrangements were made to store the airplane for the night, and I agreed to be at the airport early the next morning to get it out of the hangar.

Decisions like these are never easy, but they must be made. Maybe that explains the "lavish" salaries we pilots command.

Later that same evening, the renter pilot got a weather briefing from Flight Service, filed a VFR flight plan, and departed Atlantic City for home. Shortly thereafter, he contacted a flight service station reporting that he was in IFR conditions with heavy rain and extreme turbulence. Flight service coordinated with Atlantic City Approach to identify the airplane and provide vectors out of the weather.

I've often wondered what compelled that pilot to launch into such severe weather. Was he pressured by his friends? Did he feel compelled to demonstrate his ability to complete the flight? Did he fail to understand his weather briefing? Perhaps he was taken in by the weather at his departure point, which was still VFR. Unfortunately, we'll never know.

The next day was beautiful, as it usually is after a squall line passes. In the morning the airplane was found in a tidal marsh on the north shore of Delaware Bay. It had crashed nearly vertical and buried itself up to the baggage door. Rising out of the marsh, the tail was a monument to four lives lost and five children orphaned.

**Conclusion**

Although we become comfortable as we gain experience and proficiency, we must always remember that flying is serious business. A seemingly insignificant error in procedure or lapse in judgement can lead to disastrous consequences. Aviators work hard to improve their flying skills and take great pride in their accomplishments. Unfortunately, many fail to realize that how and when we apply those skills is often more important than the level of proficiency we possess.

Skill and experience have time and again proven to be no match for complacency and contempt. ■

*Mr. Steuernagle is the Director of Program Development with the AOPA Air Safety Foundation. This article originally appeared in the January 1993 issue of the Foundation's* Flight Instructors' Safety Report *and is reprinted with permission.*

## Communication and Coordination Are the Keys to Safe and

# Effective Winter Operations

*Airports in areas that experience regular and substantial snowfall and icing conditions need to develop comprehensive snow and ice control programs to minimize winter operational risks.*

Coordination and timely communication are the keys to effective airport winter operations, recent reports compiled by the FAA say.

Airports faced with substantial snow and ice removal tasks, FAA says, need to develop clearly defined procedures to ensure that ramps, taxiways, and runways are safe for aircraft operations. These procedures and strategies are also echoed by other aviation and regulatory agencies.

According to advisory circular (AC) 150/5200–30A on airport winter safety and operations, "All airports subject to annual snowfall of several inches or more or icing conditions should have a snow committee." FAA also suggests that every airport in frequent and heavy snowfall areas establish a snow control center to coordinate all snow and ice control activities.

In addition, FAA recommended that every airport in such areas should have a written snow and ice control plan that "state the procedures, equipment, and materials to be used by the airport in removing snow and ice."

### Committees and Plans

The airport snow committee "expedites decision-making, reduces the response time for keeping runways, taxiways, and ramps operational, and improves the safety evaluation process that determines when or if a runway should be closed."

Such a committee would be comprised of representatives from airport management, operational staff, airline flight operations, air traffic control, fixed-base operators, flight service stations, and weather services.

A *snow control center* is designed to be a prime source and clearing house of field condition information. The snow control center would also inform air carriers and ATC of expected runway closing and opening times.

A *written snow and ice control plan* should "set out. . . objectives and the priorities assigned to airport movement areas." The plan should also "define areas of responsibility, establish operational requirements and procedures, and define relationships with contractors (if used)." The plan should address "any unique environmental, climatic, and physical conditions affecting the airport. Elements. . . included are preseason preparation, snow committee composition, snow control center location, equipment, personnel training, weather reports, field condition reports, clearance criteria, clearance priorities, supervision, and communications."

Each plan must be flexible enough to adapt snow and ice removal operations quickly to changing weather conditions and operational changes. Two-way radio communication between snow and ice control crews and the coordination centers is essential.

### Pre-Season Preparation

Pre-season preparation should include review and checks in the following areas.

- ***Equipment and supplies:*** Snow and ice removal equipment should be repaired and spare parts ordered; ice control chemicals and abrasives should be ordered and stockpiled.
- ***Training and communications:*** Practice runs should be made with the equipment in typical operational scenarios; crews should be trained in proper communications procedures and terminology.
- ***Installation of snow fences:*** Fences should be set up *before* the onset of the snow season; they should be placed in areas where previous observation has shown their effectiveness in reducing accumulation.
- ***Identification of disposal areas:*** Snow storage areas should be chosen with careful consideration given to drainage characteristics; storage areas must not interfere with aircraft operations and navigational aids.

### Weather and Runway Condition Reporting

The AC underscores the importance of accurate reporting of weather and runway conditions.

"Appropriate response to a snow or ice removal event depends on accurate information about an approaching storm and the likely effect of precipitation on airport surfaces," says the AC. "The snow or ice removal task can be reduced and costs lessened by a prompt, effective response to a storm warning."

Pavement surface condition sensors are also recommended. The sensors, embedded in the pavement, provide accurate measures of the pavement temperature and indicate the presence of moisture, ice, and the ambient air temperature near the pavement. The sensors also transmit this information directly to the snow control center, thus helping shape snow and ice control strategy, especially in the area of timing the application of anti-icing chemicals.

Runway friction testing is also crucial: "Airports serving turbojet aircraft during winter operations should have trained personnel and approved equipment to carry out runway friction testing."

Pilot braking action reports sometimes are not representative of actual runway braking conditions, so "many airports use runway friction-measuring equipment to provide an indication of the existing friction on runways contaminated by snow or ice during aircraft operations and during snow removal operations."

The testing is done by using either continuous friction-measuring equipment (self-contained or towed) or decelerometers. Use of continuous-measuring equipment is more precise, although neither device gives reliable data if operated on more than two inches of loose snow or ½-inch or slush.

### Communications and Coordination

Accurate runway friction testing requires close coordination between ground crews, ATC, airlines, and the snow control center. The airport operator must furnish appropriate communications equipment and frequencies on all vehicles used in conducting snow and ice control operations. This will ensure that operations personnel at both controlled and uncontrolled facilities can monitor appropriate ground control and/or airport advisory frequencies.

Snow removal operations also require close cooperation between the snow control center, ATC, FSS, and airport management to ensure a prompt and safe response.

When weather conditions begin to deteriorate, NOTAM's should be issued immediately, advising airport users of unusual airport conditions.

### Reducing Drifts and Removing Snow

In addition to snow fences, snow trenches also are effective in reducing the amount of drifting snow on runways. (Figure 1) Multiple trenches spaced about 10 feet apart can reduce further drifting and be used to store more snow. Trenches should be excavated no nearer than 50 feet from a runway.

Snow clearance from runways is best accomplished by operating plow teams in echelon, using a number of displacement plows to move the snow, with a minimum of rehandling, into a "windrow that can then be cast beyond the edge lights by a rotary plow." The edge lights should not be obstructed by blown or cast snow.

An effective snow removal program must also ensure:

- Equipment movements (on runways) are carefully timed and coordinated to ensure safety and operational efficiency.
- Snow bank height adjacent to runways, taxiways, and aprons must be limited to provide wing overhang clearance and to prevent operational problems caused by ingestion of ice into turbine engines or propellers striking the banks.
- Movement areas where aircraft operate at high speeds (such as turnoffs) should receive the same snow and ice control attention as runways. Says the AC, "Areas of low speed operation such as taxiways and ramps can also be critical under some conditions. Directional control and braking action should be maintained under all conditions."

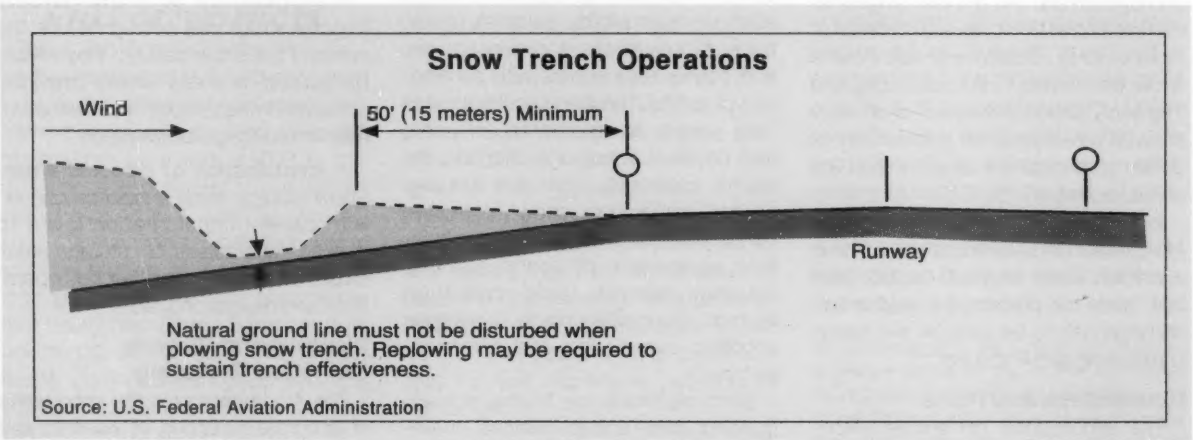
Snow Trench Operations
Wind
50' (15 meters) Minimum
Runway
Natural ground line must not be disturbed when plowing snow trench. Replowing may be required to sustain trench effectiveness.
Source: U.S. Federal Aviation Administration

*Figure 1.*

- Great care must be taken while removing snow from arresting barriers, which airports with joint military operations may have installed near the end of the active runway or at the beginning of the overrun area.
- The faces of all signs and all lights must be kept clear of snow and in good repair. Priority should be given to signs and lights associated with hold lines and the instrument landing system (ILS).

### Anti- and De-icing

Anti-icing [of pavement surfaces] is preferable to deicing whenever possible. [Ice melting is called deicing, while anti-icing lowers the freezing point of water and thereby prevents the formation of ice for a period of time.] Dry snow does not often form a strong bond with the runway surface even under freezing conditions and heavy and frequent wheel passes. However, wet snow and ice quickly develop such a bond so that "mechanical removal is either difficult, slow, or damaging to the pavement. Thus, the primary effort should be directed at bond prevention."

Anti-icing is accomplished by concentrating either thermal or chemical energy at the pavement surface. According to the AC, "Because of the high cost of installing pavement heating systems and the large amounts of energy required to maintain the surface above freezing [before] the onset of precipitation, deicing/anti-icing with approved airside chemicals is generally more economical." All such chemicals should be applied based on pavement temperature rather than air temperature.

Deicing chemicals should be applied on ice 1/16-inch or less in thickness. The AC adds, "The recommended chemical form for anti-icing is liquid, although solid chemicals can also be effective in this application. A dry, solid chemical has the disadvantage that if applied to a cold dry surface it may not adhere and, therefore, may be windblown or scattered by aircraft movements. However, certain physical properties of a solid, such as its bulk density, particle shape, etc., may reduce these tendencies. Regardless, wetting a dry anti-icing chemical, either during distribution or before or after loading into the application vehicle, improves the ability to achieve uniform distribution and improved adhesion."

U.S. standards for airside chemicals are either established by the FAA or based on specifications outlined by professional organizations such as the Society of Automotive Engineers (SAE) Aerospace Material Specifications.

Approved fluids for runway and taxiway operations are either glycol base or potassium acetate base. Solid compounds include airside urea, calcium magnesium acetate, and sodium formate.

The most effective landside chemicals used for deicing/anti-icing are from the chloride family, e.g., sodium chloride (rock salt), calcium chloride, and lithium chloride. But these chemicals are highly corrosive to aircraft and cannot be used in aircraft operational areas.

Airport operators need to monitor closely the environmental impact of chemicals used in snow and ice removal programs.

### Summary

Successful and accident-free winter operations on airports require pre-season planning, guidelines and procedures to follow, training and practice, and plenty of communication and coordination among all parties involved in using, maintaining, or managing the airport. ■

*This article is based on an "Editorial Staff Report" that originally appeared in the January/February 1993 issue of* Airport Operations *published by the Flight Safety Foundation, 2200 Wilson Blvd., Suite 500, Arlington, VA 22201–3306; (703) 522–8300. Advisory Circular 150/5200–30A, "Airport Winter Safety and Operations" can be obtained by contacting the Office of Airport Safety Standards, AAS–100, 800 Independence Avenue, S.W., Washington, DC 20591.*

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## Detecting and Reporting Suspected Unapproved Parts

*Continued from page 13*

***Buyers are advised to:***

✔ Inspect product containers for damage, another supplier's name, or absence of markings.

✔ Cross check purchase orders with the delivery receipts for proper part number or component history card.

✔ Develop a means of ensuring the shelf or service life has not expired.

✔ Verify that part identification requirements have not been tampered with (e.g., serial numbers stamped over, label improper or missing, vibroetch or serial numbers at other than normal locations).

✔ Inspect parts for visual defects or abnormalities (e.g., altered or unusual surface, absence of required plating, evidence of prior usage, scratches, new paint over old, attempted exterior repair, pitting, or corrosion).

✔ Perform supplier audits to ensure suppliers establish and maintain the quality requirements specified in the purchase order. The following are examples of subsystems that should be included in an audit program:

- *Design data control to include latest revision*
- *Supplier control*
- *Material handling/control*
- *Evidence of a production approval*
- *Manufacturing/assembly control*
- *Tool and gauge control*
- *Tests and inspections*
- *Records*

### Reporting Suspect Parts

There are two formal procedures for reporting suspected unapproved parts:

1. FAA Form 8120–11, Suspected Unapproved Parts Notification (from your local FAA office or from AC 21–29) should be forwarded immediately to FAA, System Surveillance and Analysis Division, AIR–300, P. O. Box 17030, Washington, DC 20041.
2. Suspected unapproved parts may also be reported via the toll free FAA Aviation Safety Hotline (1–800–255–1111). ■

*This article is based on FAA Advisory Circular 21–29, "Detecting and Reporting Suspected Unapproved Parts," available from the Aircraft Certification Service, Aircraft Manufacturing Division, 800 Independence Ave., S.W., Washington, DC; (202) 267–8361. Copies of a brochure on the same subject may also be obtained from the above address.*

***Question.*** *I heard that the Airspace Reclassification is going to result in a major escalation in the prohibition of aerobatics by denying aerobatics in Class E airspace. Is this true?*

**Answer.** Absolutely and unequivocally NOT TRUE! In trying to ascertain how this misconception came about, we reread FAR § 91.303(c) effective September 16, 1993 and came to the conclusion that some folks are confusing "a Class E surface area designated for an airport" with Class E airspace period. Not only is there NOT an escalation, the new classes significantly increase the amount of airspace where aerobatics can be performed. For years, a major prohibition has been in control zones which used to extend upward to 14,500 feet MSL or, in the case of Hawaii, infinity. Under airspace reclassification, FAR § 91.303(c) has been revised, and the term "control zone" has been replaced with "within the lateral boundaries of a Class B, Class C, Class D, or Class E airspace designated for an airport." Additionally, the FAA will continue its prohibition of aerobatics: (1) over any congested area of a city, town, or settlement; and (2) over an open air assembly of persons; and (3) within 4 nautical miles of the centerline of a Federal airway; and (4) when flight visibility is less than 3 miles. The accompanying graphic *(see inside back cover)* depicts the airspace in which aerobatics are prohibited without a waiver and provides an excellent illustration of "within the lateral boundaries" of the Class B and Class C airspace.

What this means is that aerobatics can be performed over the top of Class B (former TCA's) which typically are 10,000 feet MSL, over the top of Class C (former ARSA's) which typically are 4,000 feet AGL, over the top of Class D (former control zone with airport traffic area) which typically are 2,500 feet AGL, and over the top of Class E (former control zone at nontowered airport). Class E airspace does not have a defined vertical limit; therefore, the restriction on aerobatics would be 1,500 feet AGL [Ref: FAR 91.303(e)] in the absence of a waiver. Since only four Class B's (TCA's) exceed 10,000 feet MSL and none exceed 12,500 feet MSL, we can say that we have reduced the vertical limit of *every* control zone in the United States, which is another way of saying we have otherwise *increased* the amount of airspace that is available for aerobatics. Thanks for the opportunity to clear this up.

***Question.*** *What is the rule regarding aerobatics in what used to be arrival extensions to control zones?*

**Answer.** The arrival extensions are controlled airspace extending upward from the surface, and they meet the definition of "within the lateral boundaries of the surface areas of Class B, Class C, Class D, or Class E airspace designated for an airport" discussed in the answer to the preceding question. Most of the extensions are Class E and, therefore, the operating rule becomes the 1,500 foot AGL limit, in the absence of a waiver. If the extension is other than Class E, the vertical limit of the higher class and associated restriction will be as charted.

As an aside, we would like to use this forum to remind everyone that arrival extensions are established to contain instrument approach procedures to airports and are also extensions of arrival and departure paths to the airport. These areas are probably not the best place to practice that Immelmann, eight point roll, or to do spin training. Again from a safety viewpoint, while it will now be legal to perform aerobatics as low as 1,500 feet above an airport with a Class E surface area, it would certainly be prudent to determine the VFR traffic pattern altitude, and a good operating practice would be to provide a vertical safety buffer between you and your fellow airmen operating in that traffic pattern. Letting others know what you are doing, via CTAF or UNICOM, is also a good idea.

***Editor's note:*** We are planning to continue the Airspace Corner through the November/December issue. Please let us know if you want this column beyond that issue. As always, we invite questions on airspace.

### • VFR Conditions

*Thank you for the clarification of ceiling reporting criteria within control zones ("Weathering CZ's," September/October 1992). The response, while answering the writer's question, stopped short of explaining the whole issue. The other element in determining weather minimums is visibility.*

*For example, a control zone was recently established at the Pitt Greenville, NC, airport utilizing AWOS 3 for official weather reporting. Being located adjacent to a river, within a shallow valley, the airport is often blanketed by patchy morning ground fog. When one of those fog patches forms over the AWOS visibility sensors, the airport reports less than VFR conditions. Meanwhile, three miles away at a launch field used by the local hot air balloonists, it is clear blue.*

*In this case, do the balloonists (or any other pilots operating within the control zone, but not at the airport) need a special VFR clearance to launch?*

*I say, "no," as per FAR § 91.155(d)(2). Are we in agreement?*

*Kent Yoest*
*Atlanta, GA*

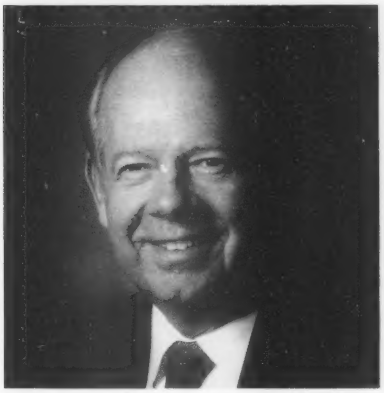
No. We cannot agree. A special VFR clearance may be needed. The answer depends upon how the AWOS is reporting conditions at the airport. If it reports the fog conditions as a ceiling of less than 1,000 feet AGL, then the balloonists will need a clearance to operate "beneath" the reported ceiling. If the AWOS reports the fog as a visibility restriction then the balloonists can launch if the flight visibility is at least three statute miles. As we said in our September/October 1992 issue, the key to operating VFR within a control zone without a special VFR clearance is a reported ceiling of 1,000 feet AGL or more at the airport for which the control zone was established and visibility of at least three statute miles. If a ceiling of less than 1,000 feet at the primary airport is reported then no aircraft can operate VFR within the control zone beneath the reported ceiling without a special VFR clearance. Pilots can operate VFR on top of a ceiling when the reported ceiling is 1,000 feet AGL or above, within a control zone as long as VFR conditions can be maintained.

Visibility is also a factor. FAR § 91.155(d) states "Except as provided in § 91.157, no person may take off or land an aircraft, or enter the traffic pattern of an airport, under VFR, within a control zone: (1) Unless ground visibility at that airport is at least three statute miles; or (2) If ground visibility is not reported at that airport, unless flight visibility during landing or takeoff, or while operating in the traffic pattern, is at least three statute miles."

In summary, if the AWOS is reporting the ceiling as 1,000 feet AGL or greater and the balloonists have a flight visibility of three statute miles or more at their launch site and can comply with FAR § 91.155, they can take off without a special VFR or IFR clearance.

FAA AVIATION NEWS welcomes comments from its readers. We may edit letters for style and/or length. We will select one representative letter from those on the same topic for publications, and because of our bimonthly publishing schedule, responses may not appear for several issues. We will send personal replies only upon request. We will not print anonymous letters, but we will withhold names upon request. Address: Editor, FAA AVIATION NEWS, AFS–810, Washington, DC 20591.

## Former Airline Executive Nominated as FAA Administrator



President Bill Clinton has nominated David R. Hinson to be the next Administrator of the FAA. Hinson is a former FBO owner, airline pilot, and founder of Midway Airlines who has 35 years of experience in aviation.

After three years as a Naval Aviator, Mr. Hinson joined Northwest Airlines in 1958. Throughout his aviation career, Mr. Hinson has also been a flight instructor and fixed base operator. He has logged over 9,000 hours of flying time and is typed in 10 different aircraft ranging from a DC–3 to an MD–11, one of the latest wide-body jets; he also has flown many types of military aircraft, including the F–4 *Phantom* and F–18 *Hornet*. His personal aircraft is currently a Beech *Baron*. He has also held flying and management positions with West Coast Airlines and United.

In 1978, along with several airline pilot colleagues, Hinson started Midway Airlines, based out of Chicago's downtown Midway Airport. He became chairman and chief executive officer of Midway in 1985, remaining in that position until Midway went out of business in November of 1991, a victim of the airline recession. McDonnell Douglas named him Vice President of Marketing and Business Development for its Douglas Aircraft Division in early 1992. He has served on the board of the Washington-based Air Transport Association, whose president, James Landry said, "The airline industry has been waiting for years for an FAA Administrator who is committed to safety and also understands the issues facing commercial aviation."

According to the *Wall Street Journal*, "Mr. Hinson's appointment won praise from many in the industry, including top executives at airlines and rival companies such as Boeing Corp." His general aviation experience as a CFI and FBO owner add to his balance for the Administrator's job.

Mr. Hinson was "on board" at the FAA in early June as a consultant. As of press time, his confirmation by the U.S. Senate is pending.

## All Flight Reviews are Biennial Again

Effective August 31, FAA cancelled the annual flight review requirement for recreational pilots and noninstrument–rated private pilots with less than 400 hours. To date these pilots have not had to comply with the annual flight review requirement because the FAA delayed the rule's implementation date pending a review of the documents and data used to justify the adoption of the annual flight review. Based upon that review, the FAA determined that the data used to develop the annual flight review was insufficient. As a result, Acting FAA Administrator Joseph M. Del Balzo signed an amendment to FAR Part 61 deleting the annual review requirement on July 19, 1993.

Several changes to FAR § 61.56, Flight Review, the rule that requires all pilots to complete a flight review, become effective August 31, 1993.

First, the new amendment deletes the annual flight review, as discussed. Then it establishes a minimum requirement of one hour flight and one hour ground instruction for the biennial flight review (BFR) required of every pilot every 24 calendar months. (The BFR requirement can be met through other acceptable means such as any required flight test, proficiency review, or completion of any phase of the FAA's Accident Prevention Program Pilot Proficiency Award Program, commonly known as "Wings." The FAR lists acceptable alternative means of meeting the BFR requirement.)

The amended rule also states that flight instructors who complete an approved flight instructor refresher course (FIRC) need not accomplish the one hour of ground instruction required by the current FAR since they receive ground instruction in the FIRC.

Finally, the amendment allows glider–rated pilots the option of substituting three instructional flights in a glider, each with a 360° turn, for the one hour of required flight instruction.

## FAA/Education Partnership Chartered

The National Coalition for Aviation Education (NCAE) signed a formal charter and established a partnership with the FAA at the recent National Congress on Aviation and Space Education in Orlando, FL. Before an audience of more than 1,000 educators, NCAE Chairman Tyson Whiteside and FAA Assistant Administrator for Human Resource Management Herbert R. McLure signed the partnership agreement, symbolizing the beginning of a formal relationship between the two organizations.

In partnership with the FAA, NCAE members will provide teaching materials to FAA Teacher Resource Centers across the country. Together the organizations will actively promote aviation education while supporting school initiatives at the local, state, and national levels.

"This new partnership indicates a cooperative spirit between industry and the FAA and emphasizes the importance of aviation education," said Chairman Whiteside. "As association representatives, we have joined together to present a united voice on aviation education issues. We need to work with aviation educators, government officials, and or own industry representatives to marshall education resources and to use aviation to train America's young people."

The NCAE, composed of 14 aviation industry and labor associations has produced *A Guide to Aviation Education Resources*. The guide, designed to be a clearinghouse of aviation education materials for teachers, lists the

resources available from each member organization. Copies are available at no charge by writing to NCAE, P. O. Box 28086, Washington, DC 20038.

### Accident Prevention Counselors Provide Production Crew Support for Sun 'n Fun

The Sun 'n Fun Fly-In 1993 at Lakeland, Florida is over, and the show and the FAA Safety Forums Series were tremendous successes. According to Obie Young, the Accident Prevention Program Manager for the North Florida Flight Standards District Office, the FAA Forums series increased their attendance by more than 100 percent compared to last year. He attributes the success to improved programming, improvements made to the FAA Aviation Safety Center building including additions to the sound, lighting, and audiovisual systems, and a trained volunteer Production Crew to support the forums.

A major part of the North Florida FSDO–15 Accident Prevention effort is directed toward motivating the local aviation community to become involved in the safety program. One of the groups supporting the Program is the Accident Prevention Counselor Production Crew that was formed to support Special Projects at the FAA Aviation Safety Center at the Lakeland Airport, Lakeland, Florida. The Production Crew supports the project with a financial commitment and many hours and long days of work.

The Production Crew Accident Prevention Counselor members were Diego Alfonso, Bill Ball, Eric Bolves, Larry Enlow, David Garner, Tom Hennessy, Joe Hinson, Harry Kimberly, Dave Lawson, Steve Moore, Mike McCormick, Ed Rice, Meredith Robbins, Tom Savage, Kay Schuttler, Vicki Sherman, Ernie Strange, Jack Tunstill, and Dave Whitman. The Production Crew FAA Members were Gail Davis, Larry Freiheit, Bill Hoenstine, Ellen Spillane, and Obie Young. Expenses born by the Accident Prevention Counselors on the Production Crew for their food and lodging alone reach over $4,700, and they contributed over 750 hours of time to support Safety Forums during Sun 'n Fun Fly-In 1993.

You might ask how this support and effort from the folks at Sun 'n Fun Fly-In, the FAA, businesses, organizations, individuals, and Accident Prevention Counselors on the Production Crew were obtained. The answer is easy... They all believe in aviation and wanted to give "The Gift of Flight" by supporting aviation safety. What a good example of the FAA/industry partnership! And they had fun, too!

### FAA Approves Use of GPS

Acting FAA Administrator Joseph Del Balzo has approved use of the Global Positioning System (GPS) for navigation in the U.S. In a recent statement he said, "We are moving rapidly to make wider use of this revolutionary new navigational system. Last year, we established standards for GPS aviation equipment, and now, we are approving its use for all phases of flight down to non-precision approaches."

Although FAA-approved GPS receivers are not on the market yet, Del Balzo said, "We expect that aircraft owners will be able to purchase cockpit GPS receivers by sometime this fall." According to his statement, this first approval will allow pilots to fly direct with approved GPS units and to fly non-precision approaches into about 2,500 airports.

In his statement, Del Balzo thanked both the Aircraft Owners and Pilots Association (AOPA) and Transport Canada for their help in testing GPS procedures.

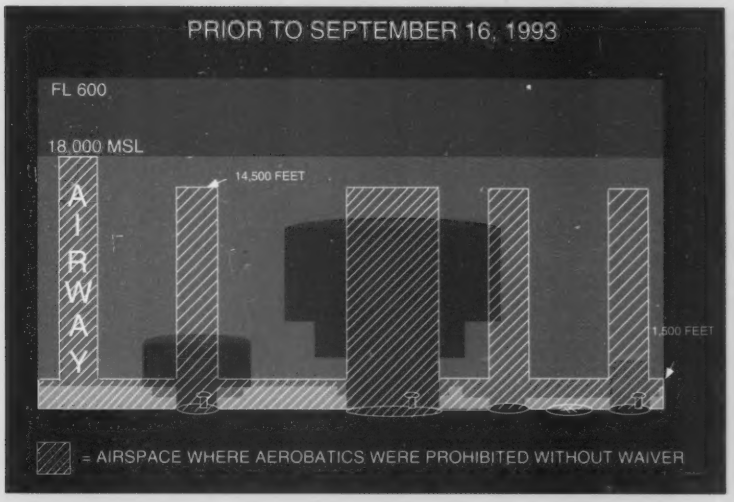
Although the satellite-based navigation system has not been declared operational by the Department of Defense, which developed and operates the system, that announcement is expected by this fall.

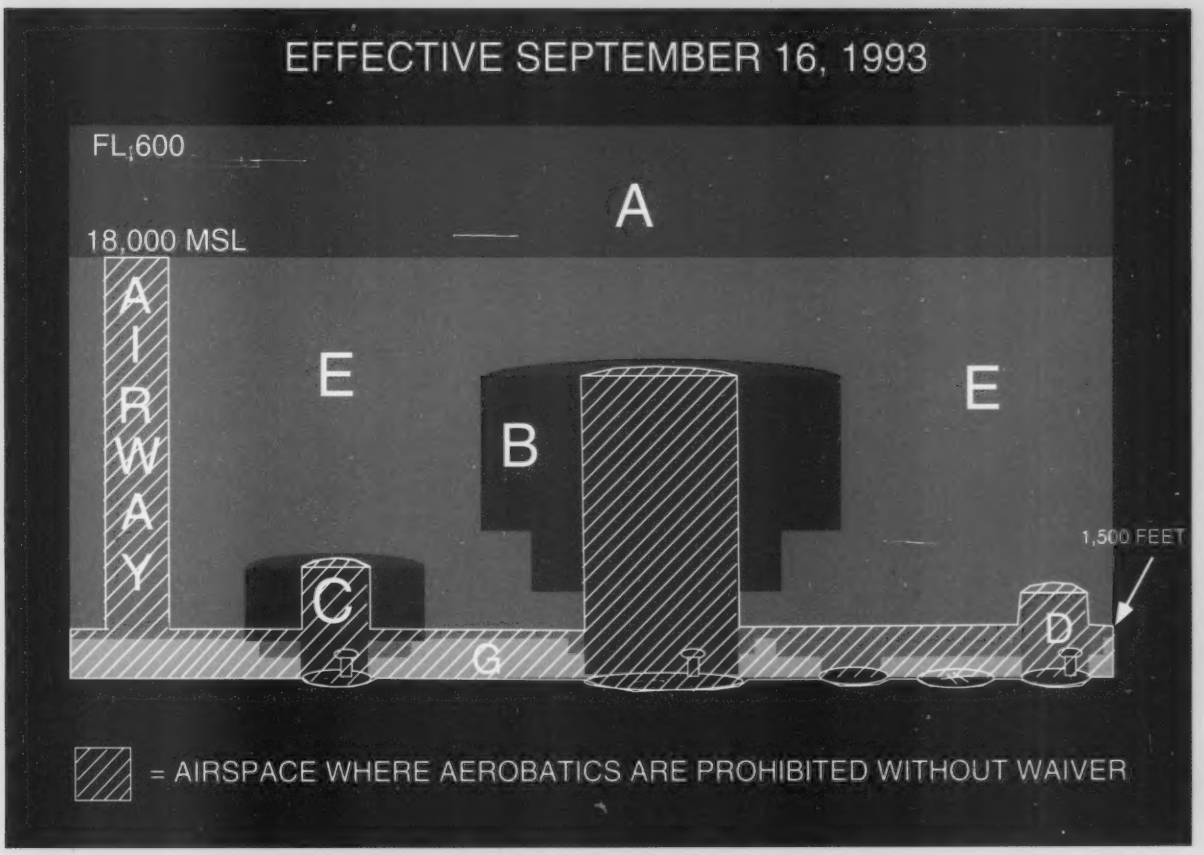
GPS, like LORAN–C, is rapidly evolving from a military system into the navigation system of choice for general aviation. GPS was first adopted by general aviation pilots using non FAA-approved receivers for VFR use. And like LORAN–C, GPS has now evolved into an IFR compatible system with FAA and industry standards for IFR receivers and their installation. As the GPS program matures and operators and the FAA gain experience with it, it is conceivable that GPS will be approved for precision IFR approaches in the future.

Owners wanting to meet FAA-approved, non-precision IFR equipment and installation standards should review some FAA publications before installing a GPS unit for IFR use. The first one is Technical Standard Order (TSO) C–129, dated 12/10/92, *Airborne Supplemental Navigation Equipment Using the Global Positioning System (GPS)*. TSO C–129 sets the minimum performance standards for GPS and lists other important GPS references. [TSO C–129 can be ordered from the U.S. Department of Transportation, Utilization and Storage Section, M–443.2, Washington, DC 20590. It can also be ordered by FAX from the Publications Office by calling (202) 366–3911.] Information on ordering other TSO's is available by writing for the *Index of Aviation Technical Standard Orders*, at the same address. The Index is also available by FAX at the same number. Two FAA Notices will also help: N–8110.47, *Airworthiness Approval of Global Positioning System (GPS) Navigation Equipment For Use As A VFR and IFR Supplemental Navigation System*, dated 4/23/93 and N–8110.48, *Airworthiness Approval Of Navigational Or Flight Management Systems Integrating Multiple Navigation Sensors*, dated 4/23/93. Each lists references that may help an owner/operator install an FAA-approved GPS system. Both notices are available free from the FAA Aircraft Certification Service, Aircraft Engineering Division (AIR–130), 800 Independence Ave., SW, Washington, DC 20591.

# Airspace for Aerobatics

*(See page 26 for the Airspace Corner)*



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